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## THE MENDELIAN THEORY OF HEREDITY.


F. G. A. STUCKEY, M.A., Wellington.


THE facts and deductions of the first part of this paper may be briefly recalled as follows :—

1. The double nature of the zygote.
2. The resemblance (more or less complete) of the $F_1$ generation to *one* of the parents.
3. The reappearance of the original parent forms in the $F_2$ generation in company with impure forms.
4. The idea of unit characters produced in allelomorphic pairs.
5. The idea of gametic segregation.
6. The Law of Dominance.

Using the terms "dominant" and "recessive," we are now in a position to state the facts of Mendelian inheritance in a more general

form, as in Diagram 3, where D stands for "dominant" and R for "recessive."

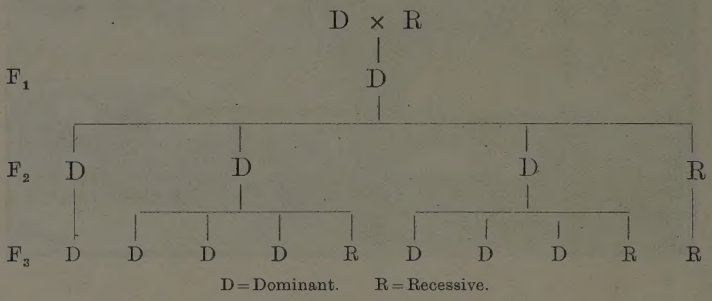


Diagram 3.

It should be noted that the individuals of the $F_2$ are distributed as follows: Out of every four we get one pure dominant, one pure recessive, and two impure dominants (1 : 2 : 1). Also, the impure dominants carry on the same sequence. It is evident in our former example tallness was dominant over dwarfness.

Reverting now to our original example, turn to the possible unions between tall-bearing and dwarf-bearing gametes (Diagram 2). Notice the constitution of the zygotes. It is clear that when the first—(D . D)—comes to produce gametes it can produce only dwarf-bearing gametes, while the fourth—(T . T)—can produce only tall-bearing gametes. Zygotes that arise from two gametes which bear the *same character* are called "homo-zygotes." They in turn produce gametes of one kind only (that is, of course, with respect to the character under consideration).

The remaining zygotes in Diagram 2—(T . D) and (D . T)—are the results of the union of gametes that are unlike with respect to the character under consideration; and, as is seen by allowing them to self-fertilize, they are capable of producing gametes of both kinds. These zygotes are called "hetero-zygotes."

It should follow that when self-fertilized, or when crossed with a similar individual, homo-zygotes should breed true, whether they are tall homo-zygotes or dwarf homo-zygotes—that is, pure dominants or pure recessives.

Hetero-zygotes, on the other hand, being able to produce both tall-bearing and dwarf-bearing gametes, may have both tall and dwarf offspring. When two of the tall-bearing gametes unite, a pure tall zygote will result; similarly with two dwarf-bearing gametes. When,

however, a tall-bearing gamete unites with a dwarf-bearing gamete the result will be an impure tall zygote. We thus get tall homo-zygotes, dwarf homo-zygotes, and tall hetero-zygotes, or, in general terms, dominant homo-zygotes, recessive homo-zygotes, and hetero-zygotes, which, of course, outwardly show the dominant character. And, further, if sufficiently large numbers of offspring are produced, we shall expect the ratio of these individuals to follow the laws of mathematical probability. The experiments already described show that this expectation is realized by the ratio of 1 : 2 : 1 in $F_2$.

What should the theory lead us to expect with regard to the mating of hetero-zygote with dominant homo-zygote and with recessive homo-zygote respectively? An example will help to make this clear—

$$\underset{\sigma}{(D.R)} \times \underset{\varphi}{(D.D)}$$

Here the possible unions are—

(D × D) 2 times
(R × D) 2 ,, } Putting the male first in each case.

We should thus get two dominant homo-zygotes and two hetero-zygotes, so that *all* should *appear* to be dominants.

Consider now the result of mating a hetero-zygote with a recessive homo-zygote.

$$\underset{\sigma}{(D.R)} \times \underset{\varphi}{(R.R)}$$

Here the possible combinations are—

(D × R) 2 times
(R × R) 2 ,, } Putting the male first in each case.

We should get two hetero-zygotes and two recessive homo-zygotes, so that there will be an equal number of recessives and (apparent) dominants.

Both these expectations are confirmed by experiments in breeding.

To the table of results given above we can now add—

7. The appearance of dominant homo-zygotes, (dominant) hetero-zygotes, and recessive homo-zygotes in $F_2$, in the ratio of 1 : 2 : 1, or (putting together the pure and impure dominants) in the ratio of 3 : 1.

The results of Mendel's researches on plants have been verified, and the experiments have been further extended. Similar experiments have been applied to animals, and many results have been obtained which fall into line with the facts of Mendelian inheritance. Hurst crossed the Belgian hare and the Angora rabbit. The $F_1$ were all outwardly Belgian hares (dominant hetero-zygotes). The $F_2$ gave

fifty-three Belgian hares and seventeen Angoras, or the Mendelian ratio of 3 : 1.

| | | |
|---|---|---|
| | Belgian hare × Angora | |
| $F_1$ | Belgian hares | |
| $F_2$ | 53 Belgian hares | 17 Angoras. |

Diagram 4.

In his experiment the hetero-zygote or $F_1$ more nearly resembled the wild grey rabbit than does the pure Belgian hare, and the same was observed of the homo-zygotes (pure Belgian hares) of the $F_2$, the "extracted" homo-zygotes as they are called. The difference in colour was probably due to some factor not yet understood. This and other evidence goes to prove that dominance may not always be quite so complete as it was once supposed, but that the hetero-zygotes may sometimes be more or less of a blend.

A classical and interesting instance of imperfect dominance and at the same time a striking example of the application of Mendelian laws is the case of the Andalusian fowl. Fanciers have long known that from any pen of so-called "pure" blue Andalusians only about half the chickens came true, while one-fourth were black and the other one-fourth were "splashed" white. These results give the Mendelian ratio of 1 : 2 : 1, and suggest that the black and the white are the pure birds (the dominant and recessive homo-zygotes respectively), while the blues are the hetero-zygotes: only that, instead of getting black on crossing the black with the white, as Mendelian laws suggest, we get black *diluted* with white—that is, blue. If the blues are really the hetero-zygotes, then by cross-breeding the black and the white (a thing which breeders never seem to have done) we should according to our theory obtain nothing but blue offspring chicks. This has been proved to be the case. The blue birds do not breed true because they are hetero-zygotes with respect to colour, but they can be produced with no failures by breeding together the dominant and recessive homo-zygotes (the black and the white).

Bateson quotes a somewhat similar example in the case of Sutton's Giant Lavender primula. This never breeds entirely true, but always throws along with lavenders a number of magentas and an equal number of whites. These magentas and whites when bred together give nothing but lavenders.

It has been said above that the pure dominants and the pure recessives that come from the first or succeeding filial generations are known as "extracted" homo-zygotes. Though these may differ in other characters, they are as pure as the original parents with respect to the characters under consideration, for it must be remembered

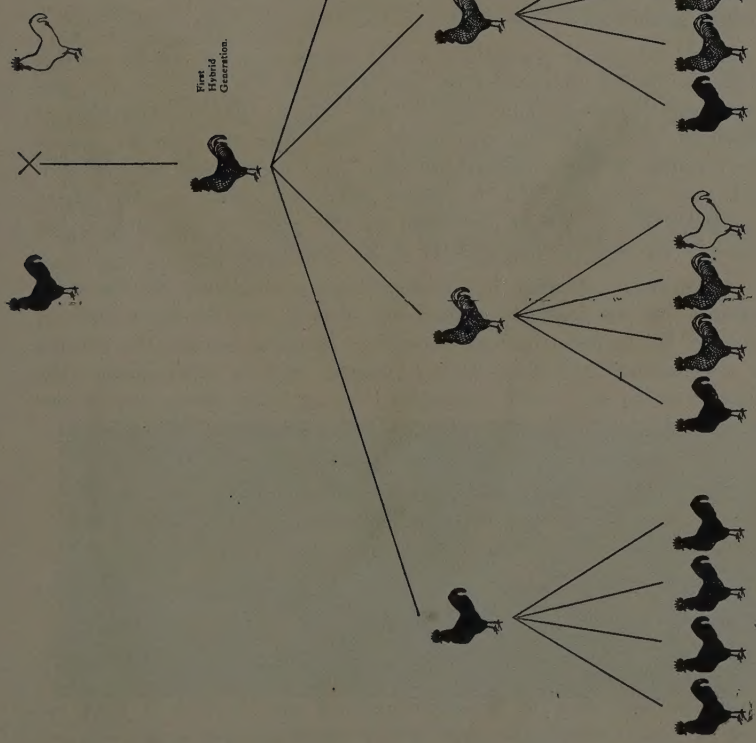


Diagram to illustrate the Mendelian Inheritance of Colour in the Andalusian Fowl.—From Darbishire's "Breeding and the Mendelian Discovery."

that we have hitherto dealt with only one pair of characters. When two pairs are taken into consideration the number of possible combinations in $F_2$ is largely increased. Thus, suppose that A and *a* represent one allelomorphic pair, B and *b* another, the dominant being in each case represented by the capital letter. The result of crossing individuals bearing among them these four characters will be in the $F_1$, a progeny which are outwardly of the character (A . B), but which represented gametically are (A . *a* . *B* . *b*). The result of interbreeding the members of $F_1$ will give in $F_2$ nine classes, which, however, will *appear* as only four, owing to the influence of the dominants. These classes, with their numerical ratios, are—

9 (A.B) : 3 (A.*b*) : 3 (*a*.B) : 1 (*a*.*b*).

These groups represent all the combinations that can be true to each of the characters under consideration, for the combinations (A.*a*) and (B.*b*) are impossible in a pure individual. Further, in each of the groups there is one individual whose gametic formula corresponds with his outward appearance. This one can be discovered and fixed in one further generation. Indeed, in the fourth group it is already fixed.

If in the above example *a* and *b* represent good qualities which a breeder wishes to combine in one individual, the result of the first cross might convince him that he had failed. But a knowledge of Mendelian laws tells him that if he breeds from his hybrids, one in every sixteen of their progeny will have the required qualities combined and fixed. Similarly for the other characters shown in the above example. For a further discussion of this phase of the subject the reader is referred to Chapter XIII of Mr. Darbishire's book.

An example of what has already been accomplished in the combination of two useful characters by working on Mendelian lines is afforded by Professor Biffen's success in breeding wheat. On crossing a rust-resisting but unproductive variety with a non-resisting but productive variety, the $F_1$ proved to be all non-resisting and unproductive. The $F_2$ generation obtained from these showed four classes :—

1. Unproductive and non-resisting.
2. Productive and non-resisting.
3. Unproductive and resisting.
4. Productive and resisting.

The fourth class was what was being sought for, and as both characters are recessive the type was ready fixed.

It must not be thought that all problems of heredity can be analysed and explained as simply as the examples given above. Much work has been done in Mendelian research and a flood of light has been thrown on the subject, but there is still much that awaits explana-

tion. In the meantime, however, the discovery has been of great practical importance to the breeder. It has taught him to attach a new meaning to the term "purebred"; that he must have regard not to the outward form but to the constitution of the germ cells. This knowledge can only be fully obtained by breeding from the plant or animal, as the case may be. In "Breeding and the Mendelian Theory," A. D. Darbishire says, "Indeed, the difference between modern and old-fashioned principles of breeding may be summed up in the statement that whilst the old-fashioned breeder looked for guidance to the pedigree of the animal or plants he was breeding, the modern one looks to their gametes. The former looks to their ancestry, the latter to their offspring: the former looks backwards, the latter forwards."

Bateson gives a list of characters in both plants and animals that behave as unit characters, and are transmitted according to the Mendelian scheme. As a practical guide *everything depends on a knowledge of what characters are so inherited*, and definite information on this point can only be attained by patient and careful experiment and investigation.

To those who are sufficiently interested in the subject to wish to follow it further, I recommend Darbishire's book "Breeding and the Mendelian Theory" (Cassel and Co., 1911). Bateson's book ("Mendel's Principles of Heredity"—Cambridge University Press, 1909) is the fullest treatise so far published, but is somewhat abstruse for the general reader. "Mendelism," by R. C. Punnet (Macmillan and Bowes, Cambridge, 1905), contains a capital statement of the theory, and is very readable.

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Romney Ewes and Lambs at the Weraroa Experimental Farm.

# ENSILAGE.

## LESSONS OF PRACTICAL EXPERIENCE.

W. Dibble.

A constant supply of succulent fodder is the best of all means of maintaining stock in thriving condition, and, with few exceptions, is the most effective means of enabling the animal to return its maximum profit. Especially is this the case with the deep-milking cow. It is not too much to say that if dairy stock were provided with a plentiful supply of succulent food right throughout the year the business of milk-production would be placed on a very much more satisfactory plane than it is on at present. To ensure this continuity of the right class of feed, ensilage becomes a matter of necessity. This is not to say that succulent feed is everything. To produce her maximum supply of milk the modern "dairy cow" demands a properly balanced ration. Not that we need go to the lengths of our American friends in the preparation of scientifically balanced foods, but that we merely observe the dictates of common-sense, and provide some dry matter when the pasturage is watery and lacking in body, as in the early days of spring, and some succulent material when the grass is dry and woody, as in the late summer and autumn. It is absurd to expect a deep-milking cow to produce her highest possible yield when she is provided only with rank feed at one time and then has to be content with an extreme—the dried-up herbage—at a later period.

There is a common, but mistaken, impression that ensilage is only a winter food. As a matter of fact, it is more valuable as an adjunct, or substitute, for pasturage at other periods of the year, more particularly in those dry spells which too often occur at the most inopportune phase of the lactation period—when the cow is in the flush of her season. In my own early experience with ensilage—milking from 150 to 180 cows for a city milk business—I always saved the silage for the drier months of the summer, and fed hay, roots, &c., in winter. By making the maize into the silage I was independent of the season, being thus in a position to commence the feeding just when the cows were ready for it; whereas in some seasons the dry spell would come on before the green maize would be ready. My usual procedure was to make in one summer silage for the next summer. I have used molasses—sprinkled over the silage when being forked on to the dray — with excellent effect. Two gallons of the

molasses were mixed with ten gallons of warm water, or thin enough to run easily through a watering-can, the holes in the rose of which were made larger for the purpose. On this diet the cows kept in the pink of condition, with hides as sleek as that of a well-groomed thoroughbred, and maintained a great flow of milk through an exceptionally dry summer. I always found it imperative—where it was a question of maintaining a regular and big volume of milk—that a balanced food had to be provided. Thus, in the early spring, when the watery nature of the herbage made it sometimes difficult to secure the desired return, I fed hay. As cows will generally not look at the ordinary hay when young grass is available, especially after a winter's experience of it, the choicest hay, generally the centre of a stack, was kept for this purpose, and only a little was required.

While good ensilage is an ideal milk food in the dry months of summer, it is equally serviceable in the winter, and, in fact, at all times when the natural pastures are not at their best, or fail to provide the required feed. It may be said that with green maize for the dry months and roots and hay for the winter, especially in a country like New Zealand, where green crops can be grown with comparative ease, there is not the necessity for ensilage. The fact has to be remembered, however, that there is a considerable degree of uncertainty, with our rather variable climate, in regard to the production of crops which have to be immediately utilized, whereas ensilage is the most certain of all fodders which can be provided. Not only this, but it may be prepared in seasons of abundance, and from material which would otherwise be wasted, the utilization of which for silage will be an advantage rather than otherwise to the land. Again, well-prepared silage is a standing insurance against weather adversity. If not required in the season in which it is prepared it may be left over till the next, and even to the third and fourth seasons if this be necessary, though in these days of long and heavy milking-periods there is hardly a season when, if a cow is fed as she should be—and there is no such thing as overfeeding the deep-milker—ensilage will not be required. While ensilage may be prepared from practically anything on the farm—Californian thistles have largely entered into very fair samples—it should be remembered that the better the material of which it is composed the better will be the resulting silage. Good ensilage may be made from summer abundance of grass, but the finest samples are prepared from lucerne, clovers, maize, sorghum, millet, tares, oats, &c.

Ensilage, by the way, should always be fed to dairy cows in the field, and for this reason the stack system presents a great advantage. When fed in the shed it is difficult to prevent the milk becoming tainted, especially when the milker handles the silage. The tainting is not through the cow feeding on the material, but is due to a strong aroma which clings to everything with which the silage comes in contact.

The value of ensilage for dairy cattle is here emphasized, but its suitability for all classes of stock has been repeatedly demonstrated in America and Australia; while during the past winter several southern farmers who co-operated with the Department in conducting experiments in silage-making have proved its value for horses, and in Hawke's Bay sheep have done well on silage carted out to them in the field.

### The Past Season's Experience.

Last summer a number of farmers in different parts of the Dominion co-operated with the Department in the conduct of demonstrations as to the value of stack ensilage in their respective districts. In several instances—in the South Island—Californian thistle entered largely into the material employed. Some reports on this co-operative work are herein published. It may be pointed out that, in cutting Californian thistles for silage, the thistles were cut in the budding stage, which not only checked the development of the weed, but allowed the grass to come away.

### A Canterbury Experience.

A Canterbury farmer prepared a stack of silage from grass and clover, with some rather poor maize and a fifth of an acre of peas. Five acres of grass and clover, from which the silage was principally made, had been dressed with 3 cwt. of basic slag to the acre, the land never, in the owner's memory, having grown a good crop of anything before. The paddocks were shut up in the beginning of November, and the silage was made on April of this year. Feeding dairy stock on the silage was commenced on the 1st of June, the cows having a few turnips as well during this month. The silage lasted till the end of August. The smallest number of cattle fed was sixteen for a few weeks, the largest number being over forty for a little over a week, the average being eighteen head for three months on the produce of 6½ acres. The stock did well on the silage, which was relished by both horses and cows, while the pigs were very partial to the maize portion. The cattle were specially fond of the maize, which turned out sour, and they milked better on it than on the clover. The more ensilage the cows received the better they milked. The owner concludes his report by declaring that the practice of making ensilage certainly increases the carrying-capacity of a farm; and he is doing his best to provide for more silage this year.

### Maize Ensilage.

Mr. R. Newell, of Papanui, who made a stack from an exceptionally heavy crop of maize, reports: "I am satisfied that in the future

the dairy-farmer who wishes to succeed, and face the high values of land, will only be able to do so by feeding silage. Your instructions I practically carried out to the last letter, and found that the information from start to finish was perfectly right. My cows are better this year as a result of being fed on the silage. I have my land already ploughed (27th August) for next season's crop."

### Silage from Californian Thistle.

Mr. Crawford Anderson, of Stirling, who made a stack entirely from Californian thistle, writes: "My dairy cows are very fond of the ensilage. There can be no doubt about the value of ensilage made from anything edible. As far as the experiment goes, it has been successful. I used several tons of the ensilage in the early part of the winter, and will use the balance later on."

### Clover, Wheat, and Thistle.

Two stacks were built by Mr. James Patrick, of Lee Creek Farm, Taieri—one from wheat and Californian thistle, and the other from clover, wheat, and thistle. The former is being kept for next year. Reporting on the latter, Mr. Patrick says, "In reference to the experiment, I may state that it was in every way a decided success, and that the stock I fed on it (cattle and horses) preferred it to any other feed available on the farm, that young cattle specially relished and fattened on it quickly, and that some draught mares I was feeding with ensilage had to have it stopped on account of putting on too much flesh. Last year I built two stacks of this ensilage, only one of which I fed to stock during the winter, having plenty of other feed on hand, and will keep the remaining stack (which had about 200 tons of material put into it) for next year. It is my intention to build another large stack of ensilage during the coming season, as I consider it a valuable winter feed."

### How the Stacks were built.

The above stacks were constructed under my supervision on the principles previously laid down in the *Journal*. The first 6 ft. were allowed to settle well, and when the temperature had risen to 120°—this being ascertained by a thermometer suspended by means of a string in an inch galvanized-iron pipe—the stacking of the remainder of the material was proceeded with. As long as 3 ft. of the material was added each day, it was found that the desired temperature (from 120° to 150° Fahr.) could be controlled. The usual weighting employed was about 24 in. of earth held in position by a rough framework of timber.

Banner Oat. Universal Oat.

*Banner Oat.*—The heaviest-yielding oat in the co-operative experiment variety tests in the South Island, 1911–12 season. Yield, 145·19 bushels per acre. Manure: Burnside special, 1½ cwt. per acre: cost, 10s. 6d. per acre. Grown by H. Snushall, Clydevale.

*Universal Oat.*—Gave the most successful result in the co-operative experiment manurial tests in the South Island, 1911–12 season. Yield, 118·79 bushels per acre. Manure: Superphosphate, 1 cwt.; nitrate soda, ¼ cwt.; seed gypsum, ¼ cwt.: cost, 9s. 3d. per acre. Grown by H. Snushall, Clydevale.

Velvet Chaff. Red Marvel.

*Velvet Chaff.*—Gave the best return on the co-operative experiment (wheat manurial tests) in the South Island, 1911–12 season. Yield, 87·58 bushels per acre. Manure: Superphosphate, 1½ cwt. per acre: cost, 7s. 1½d. per acre. Grown by W. G. Paul, Waimate.

*Red Marvel.*—The highest-yielding wheat in the co-operative experiment (wheat variety tests) in the South Island, 1911–12 season. Yield, 61·58 bushels per acre. Grown by W. G. Paul, Waimate.

# PLOUGHS AND PLOUGHING.

Primrose McConnell.

The plough must always rank first in importance among all implements ever devised by man, for it is not only the foundation of all agricultural work, but it is also the means of supplying material which provides work for other and more intricate machinery. The originator of the proverb "The pen is mightier than the sword" might well have added, "but the plough is mightier than either." The plough is the foundation of all real civilization, and without it the world would be reduced to a state of poverty-stricken barbarity.

Although in recent years the details of this implement have been added to and improved, yet the form is similar to that used by the patriarchs thousands of years ago—namely, a long beam in front, a handle or two handles behind, and a curve like a fish-hook underneath. Of late years many improvements in the construction have been effected, and ploughs may now be had to suit any soil or system of cropping, including the very valuable and powerful implements used in reclamation work and the ordinary ploughs of great capacity worked by the steam or motor tractor.

The swing-plough, which held sway for many years, was a most effective implement in skilled hands, but the ploughman who could not set this plough to run at an even depth and uniform width of furrow with the absence of an undue friction at any point could never do good work, and the labour required of ploughman and team was much increased. The advent of wheels to some extent hid the faults of the unskilled ploughman, as far as the setting of his plough is concerned; but even the wheel plough requires to be correctly adjusted, for if there is too much friction on any part the work is inferior and the draught much greater than it should be. It would be an education to the unskilled ploughman if he used the dynamometer occasionally, as its use would enable him to see the enormous difference in draught required between that of a well-adjusted and that of a badly-adjusted plough. A first-class ploughman is almost invariably a good horseman, and the man who is continually shouting at or abusing his horses can never hope to do good work; also, if he is constantly hammering and adjusting his plough his case is to a like extent hopeless.

Of late years the digging-plough has come much into favour, and deservedly so. In the writer's opinion it is one of the most effective of all farm implements, and, if properly set, it not only pulverizes the soil thoroughly, but also buries all weeds and rubbish effec-

tively. The objection, that for autumn ploughing it pulverizes the soil too much, is gradually disappearing, for the soil, being better broken up and spread about, is more exposed to the action of sun and air; also no plough leaves the soil in such a light condition, there being no "packing," as is the case with the ordinary plough. In the days of hand-sowing a wedge-shaped well-packed furrow was essential, and on very light dry soils a special packing-implement to come after the plough was used with good results, but the advent of the corn-drill did away with the necessity; and if light soils require consolidating before drilling, the work can be done as effectively and much cheaper with the roller.

The digger has a further advantage in having fewer parts than other ploughs, and on land which is of such a nature as will "scour the breast" the draught of the former is much less than that of the latter, there being less pressure on the sole, breast, and cheek, on account of the reduced length of all three. On the other hand, if the digger-breast does not "scour" the draught is increased to as much as, or even more than, that of the plough with the long twisted breast and the comparatively long cheek and sole. To obviate this drawback to some extent, greater attention should be paid to the matter of oiling the breast when not in use.

The disc plough has its uses, and for cross-ploughing it is excellent, but in the correct sense of the word it is not a plough at all, and can never take the place of the plough even in a modified sense—it would be more correct to call it a "disc cultivator."

The subsoil plough is undoubtedly a most valuable implement, and we do not use it as often as we should. A very useful form of this plough is the single disc and subsoil combined, but it has the fault of all discs, it does not turn the top furrow properly — just simply shoves it to one side. Very effective subsoiling may be done with a strong skeleton single-furrow plough, which follows an ordinary plough and breaks up the hard part (the pan) in the bottom of the furrow. Even in soil which does not possess a natural pan, such as iron, &c., continuous ploughing at one depth forms a pan that is almost impervious, and the breaking-up of this becomes imperative if the best results are to be obtained. It is not so much a matter of deep ploughing as of deep stirring or cultivation, especially where the top soil is thin and the subsoil is of the worst. At the same time the writer advocates deep ploughing when the nature of the soil will admit it. Air in the soil is necessary for plant-growth, and this air is to a great extent introduced by the rainfall. It may naturally be concluded that the greater depth to which the soil is cultivated the greater will be the quantity of water stored, and hence the greater quantity of oxygen present.

Further, with an impervious soil the land becomes waterlogged, and a waterlogged soil is a cold soil. The great evil of this lies not in the fact that the soil contains too much water, but in the fact that too little water passes through it, and oxygen can only be conveyed in sufficient quantities when the water percolates freely. It is almost impossible for too much water to pass through the soil, and if deep cultivation is neglected the supply of sufficient oxygen for robust plant-life is not forthcoming; not only so, but scientists tell us that the nitrogen in the soil is converted into nitrates by certain soil-bacteria whose action is limited in the absence of sufficient air. Also, in the absence of aeration by deep and good cultivation, the bacteria, instead of preparing more nitrates, are compelled to live on the oxygen already stored in the soil-nitrates. It is also well known that thorough and deep cultivation is the best insurance against a droughty season.

Many Australian farmers who have been in the habit of tickling the soil to a depth of from 2 in. to 4 in. are now beginning to realize the advantages of deeper cultivation, as by this means they secure a greater reserve of moisture, and hence much greater yields per acre.

With such results before us the only conclusion we can arrive at is that the use of the subsoil plough or other deep-stirring implement is of the greatest importance and is absolutely essential in intensive and profitable farming. Strange to say, there are many farmers who believe in cultivating their gardens to a great depth, but who cannot see the force of applying the same rule to the cultivation of their paddocks.

The hillside or turnwrest plough is undoubtedly a labour-saver, but when used for hillsides only the ultimate benefit may be questioned. Not only is the soil gradually worked away from where there is already too little, but some recent experiments seem to clearly prove that more profitable results are obtained when the hillsides are ploughed one way only (downhill), the plough returning empty up the hill. The reason of this result is not clear, but the result of such experiments confirm the soundness of the practice carried out many years ago. The writer was brought up on a farm that could boast of few level paddocks, but many were excessively steep, and these were invariably ploughed one way—downhill—the plough returning unloaded to the top of the hill. This system was called "fetch furrowing," and always gave good results, its value being discovered not through any scientific knowledge on the part of the farmers, but through long and careful observation.

Such a system may mean no end of labour, but we in New Zealand are beginning to realize that it is more profitable to grow a big crop by the intensive cultivation of 5 acres than to grow next to nothing on 20 acres as a result of indifferent cultivation. In seasons such as

this the patience and skill of the best farmers are put to a severe test. At the date of writing (25th September) practically no cultivation work has been done at this station during the past five weeks, on account of the excessive rainfall. A considerable area had previously been prepared for crops, but the continuous wet weather has undone the whole of the work. The only remedy is patience and the plough — and the latter must be resorted to if a thorough job is required, especially where tap-root weeds have become numerous and luxuriant. To give soil in such a condition a mere scratch with the harrow and throw the seed on any way is the safest manner in which to secure disappointment and disaster. Care should be taken not to put the teams on the land until it is sufficiently dry; also that after ploughing no time should be lost in using the disc, otherwise the high drying winds that usually obtain at this season will bake the soil into bricks and render fine tilth almost impossible. It is better to have a late harvest than put the teams on the land, especially clay land, before it is sufficiently dry, as this ruins the texture of the soil, and under such conditions a successful crop cannot reasonably be expected.

For reploughing under such conditions the digger-plough is a great labour-saver, as it both ploughs and harrows in one operation, especially if the breast-wing is enlarged and set as low as possible. Where the single-furrow plough is in use, land may be ploughed in a comparatively wet state, if the horses are yoked one in front of the other and both made to walk in the furrow to avoid treading on the land. On some of the stiff clays of the southern counties of England it is not uncommon to see as many as five horses all walking in a furrow one in front of the other. I have been amused by the criticisms passed on this system by New Zealand visitors to England, and it is well to remind these critics that in such madness there is a great deal more method and science than they seem able to grasp.

# RECLAMATION OF SAND-AREAS.

A. Macpherson.

From a national point of view there is a great economic need of bringing into profitable use the vast coastal sand-areas lying eastward from Christchurch and found in many other localities in a country, such as New Zealand, which has a great sea frontage, conditions which are also found in the neighbourhood of many of our rivers.

Throughout the special area above referred to there are many extensive fertile depressions producing splendid pastures, yielding heavy crops of hay, and growing fine roots, while there are other low-lying portions some of which are of a peaty formation and are waterlogged. This report will not deal with these latter, but with the more extensive sand-flats and sand-dunes where the sand has been blown into ridges varying from narrow drifts to great sandhills, areas which immediately adjoin, and in most instances surround, the depressions. Some years ago these sand flats and dunes were sown with the seeds of leguminous plants — lupin, gorse, and broom — which grew, seeded, and rapidly spread, so that throughout the whole area the sands have been fairly well covered for a number of years, and are thus prevented from being drifted by the wind. This growth of leguminous plants, in addition to stopping any movement of the sand, has been gradually adding the desired humus as well as enriching the sand by the nitrogen gathered from the atmosphere by means of the bacteria in the root nodules.

Up to the present time no serious attempt has been made by the owners or the occupiers of sand-areas to bring these into profitable use. Apparently they do not realize that such areas are not barren, but already contain sufficient plant-food to give excellent results if properly managed and suitable crops be grown.

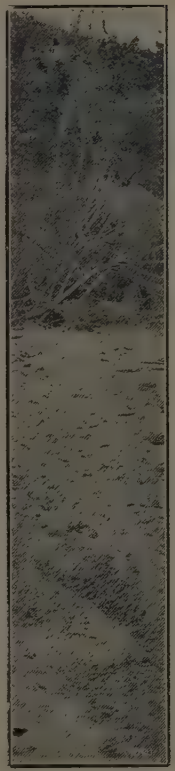
In the spring of 1911 the Department of Agriculture, in order to encourage the cultivation of lucerne throughout the Dominion, and to test the value of this forage plant under varying conditions of soil and climate, offered to supply farmers, free of cost, with sufficient seed, lime, and inoculated soil to test 1 acre. In the South Island about seventy tests were carried out. Two of these were conducted on the sand-areas referred to, one at the Government institution, Te Oranga Home, Burwood, and the other on the farm of Mr. H. Hartnell, Bromley.

These plots were chosen to bring to the notice of people occupying sandy soils in the neighbourhood, principally dairy-farmers, that these were capable of being profitably utilized and would grow excellent lucerne crops, the stand-by of the most successful dairy-farmers in some other parts of the world. About 1 acre was sown with lucerne at each place on loose shifting sand. The area in both cases was divided into four plots, according to the scheme set forth by the Department, one plot being sown with seed only, the second plot with seed and 75 lb. of inoculated soil, the third plot with seed and 350 lb. of lime, and the fourth plot with seed, 75 lb. inoculated soil, and 350 lb. lime. The seeding was at the rate of 15 lb. per acre.

At Te Oranga Home, just as the lucerne was brairding in last spring, a severe gale of wind was experienced, which carried away the surface of the area—the sand as well as the plants—to a depth of over 1 in. It was at first thought the experiment was ruined, but within a few days the lucerne-seed and the few seedlings which remained asserted themselves, and the stand to-day, one year afterwards, is very fair indeed. The test plots on Mr. Hartnell's farm have done splendidly. Three cuttings were obtained last season from the acre, and this spring, eleven months after the sowing, the crop is 16 in. high, and is an excellent stand. In neither of the two experimental areas mentioned can any difference be detected so far between the differently treated plots, which indicates that lucerne can be grown on these sandy soils without the application of inoculated soil, or, indeed, of lime.

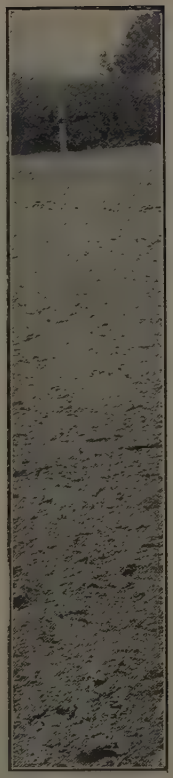
It should be emphasized that the above gratifying results were obtained without any special humus—to bind the sand and pro-

Typical Sand Country to be reclaimed.



Moving Sand adjoining the Lucerne Plot.

Lucerne on Sand. Planted 13th October, 1911. Three Cuttings made Last Summer. Photographed 19th September, 1912.



Loose Sand adjoining the Lucerne Plot.

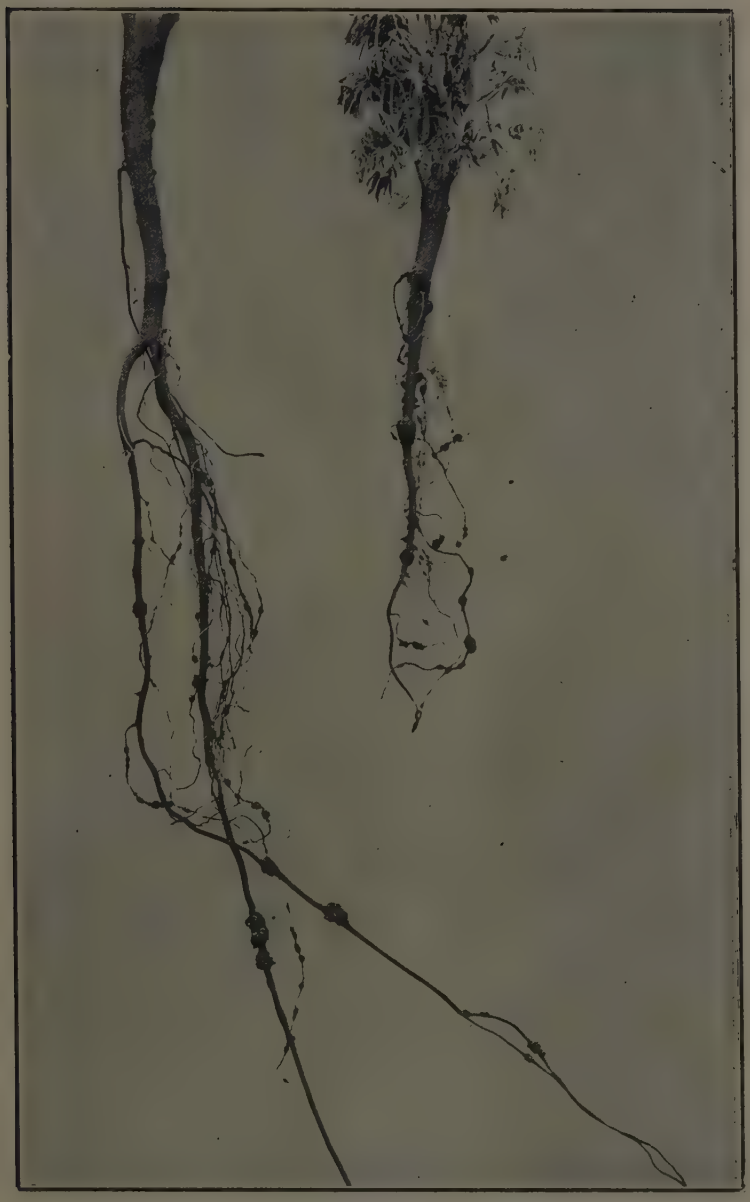
LUCERNE IN SAND AT TE ORANGA HOME, BURWOOD.

Showing the growth which came away after it was thought the seedlings had been destroyed by wind, which apparently carried away the young seedlings with the sand. When the photograph was taken the lucerne had been eaten off by cattle, this being done to enable the lupin to be dug in between the rows, in order to provide humus and a sand-binding medium.

vide a good seed-bed—having been artificially provided. Thus the lucerne has thrived with a modicum of humus — provided by the decayed foliage of lupins, gorse, and broom — with no lime and with no inoculated soil. The apparent need at the present time is something to bind the sand and prevent it drifting, even when the lucerne is well established. This, I believe, will be secured by ploughing in light branches of young plants of the legumes growing in the neighbourhood — lupin, broom, and gorse. For green-manuring the lupin has no superior, and in Europe, especially along the Mediterranean, is extensively used for this purpose. In some sections of western Europe it has effectively restored to fertility sterile sandy soil, very similar in character to the sand country being dealt with at Christchurch. The lupins employed in the Northern Hemisphere for ploughing in are the several annual species, the chief of these being Yellow lupin (*Lupinus luteus* L.), and in lesser degree Blue lupin (*L. angustifolius* L.), and White lupin (*L. albus* L.). Seed of these varieties is being imported by the Department for the purpose of growing for ploughing in on sand experimental areas. Percival, in "Agricultural Botany," says of the annual species of lupin that "they are all exceptionally rich in nitrogenous constituents, and grow on poor sandy soils, which they enrich enormously when ploughed in." In the fixation and improvement of the moving sands on the dry sandy heaths and marshes of Campine (Belgium) recourse is had to artificial manures combined with green manures, especially lupin. "The use of basic slag and kainit, also of lupins," says A. P. Grenfell in the "Quarterly Journal of Forestry," "has become part of modern practice for the planting and reafforestation of the Campine, and has already given satisfactory results."

Gorse and broom are not so valuable for green-manuring, but are decidedly useful where the lupin is not available. Wherever possible the lupin is being employed at Burwood and Bromley. The accompanying photograph will show the stage at which the lupin is turned in.

The sand-areas being dealt with are largely covered, whole or in part, by either lupin, gorse, or broom, and in preparing the sand for lucerne the above plants have to be removed. Here considerable caution is required, as the sand must be kept protected as long as possible, until sufficient humus has been created to bind the sand and thus prevent it drifting. Where lucerne has already been established on the bare sand—having been sown in drills—humus is being provided by digging in between the drills small branches of lupin. One precaution must always be taken: If a hill is to be dealt with any plant covering should not be removed till some humus-providing material has been dug in.



Bacterial Nodules on Lupin-roots.

The root on the left is an established plant; that on the right is a plant suitable for ploughing in.

Of course, other crops than lucerne should succeed in sand country. Experiments are now in progress at both Burwood and Bromley with potatoes, carrots, and parsnips. For humus-creating purposes rye, rape, and white mustard are being grown for subsequent ploughing-in.

The work at Burwood and Bromley—where the conditions are very similar to those of the vast area of sand-covered country in the district—is being carefully conducted, an exact record being kept of each stage of its progress, in order that an accurate history may be available as a guide to those desiring to carry on reclamation operations on a practical scale, and as a reliable guide in future experimental work. The progress of the experiments will be duly reported on in the *Journal*.

## THE GRASS-GRUB.

The effects of the New Zealand grass-grub have been very much in evidence in the Canterbury District, especially in the southern sections. Its ravages have been most noticeable on the winter-sown wheat; in fact, in many instances it has completely destroyed all the sowings of this crop.

## MENDELISM AND POTATOES.

At a recent conference of British agricultural teachers, held at Cambridge University, Dr. Salaman lectured on the subject of his researches on potato-breeding. He has succeeded in establishing that the inheritance of many characters in the potato is governed by the Mendelian law. Practically all domestic varieties are hybrid in the Mendelian sense—that is, if the flowers are selfed and plants are raised from the true seed (as distinct from the tuber) a large number of types differing from the parent are produced. Dr. Salaman showed that in regard to shape of tuber (long or round), habit of growth (erect or procumbent), colour of tuber (red, purple, or white), the inheritance follows the Mendelian law of segregation. Interesting results have been obtained from a study of the wild species *Solanus etuberosum*, which, though grown in England for many years previously, set seed for the first time in 1906. The interest of this variety lies in the fact that it is believed to be immune to *Phytophthora* disease, and there is consequently a possibility that by working on Mendelian lines it may be practicable to produce a variety of the domestic potato immune to this disease.—*Journal of the British Board of Agriculture.*

Lupin—the blue-flowering annual species—has been sown in the revegetating experiments being conducted at Edward's Creek, Whale's Back, and Haldon Station (Mackenzie Plain), and at Earnscleugh (Central Otago), the object being to feed off as well as to plough in for humus-creating purposes. So far very satisfactory results have been attained.

Lupin Seedlings growing in Sand, at a suitable Stage for ploughing in.

# THE BLACKBERRY-BUD MOTH.

## A PROMISING AGENT FOR CONTROL.

A. H. Cockayne.

In many districts in New Zealand the blackberry has become a very serious weed, and its control, especially in rough country and that recently converted from forest to grass, is a matter of quite grave concern. The blackberry as an aggressive weed occurs over very large areas, but it is essentially a weed of wet districts and of localities where alternate cropping is not carried out. In the purely agricultural portions of New Zealand, as distinguished from the pastoral portions, the blackberry can never become a weed of any great importance. Wherever ploughing is a regular operation the blackberry, like all true shrubs, must naturally be eliminated from amongst the noxious weeds that the farmer is likely to have to contend against on such land. In such localities it may become widespread over all waste lands, but on the arable portions it need never be feared. Thus, for instance, in districts such as the Canterbury Plains, where cropping and temporary pastures form the basis of all farming operations, the blackberry is not a dangerous problem. At the present time the blackberry is extremely serious on much land that has in recent years been converted from bush to pasture. This is especially true in such districts as the west coast of the South Island and wetter portions of the west coast of the North Island. In these districts it is not only a bad weed of the cleared country, but has also entered into the areas of standing timber, but here it is in general restricted to the outskirts.

### Its Origin in New Zealand.

The blackberry is one of the few pernicious of introduced plants that does not owe its origin to having been sown in agricultural seeds. It being a shrub, it naturally is never found as an impurity in any seed, and, like the broom, gorse, hakea, and sweetbriar, it owes its presence in New Zealand to having been utilized for certain definite purposes before it outstepped its position as a cultivated plant and became a serious weed.

### Methods of Spread.

The blackberry is spread from place to place by seed, which is in general conveyed by animals, birds being naturally the main agent in

this method of dispersal. Stock, no doubt, also, as is the case with the sweetbriar, play a not unimportant part in the spread of the blackberry. The individual plants themselves may, in a series of years, occupy a very large space of ground. The way in which the arching branches bend down to the ground and then root — thus virtually producing new plants—enables the blackberry to increase enormously, and in this way immense thickets quite impenetrable either to man or stock are formed.

## Methods of Control.

The main methods of control that have been employed have been cutting and burning, followed, in the case of pastures, by keeping the young fresh growth mowed down.

In country which is very rough and where stumps and logs are numerous the use of goats has been followed with most excellent results. Where the blackberries have taken control over very large areas—and, owing to the extensive rooting of the plants, have made the ground almost impossible to stock—any method of effective control must necessarily be expensive. In all such cases the increase in value of the land must be greater than the cost of control. What is really wanted is a method whereby the worst areas can be kept at a nominal cost from spreading on to comparatively clean land. In such cases the eradication of the weed can be held in abeyance until such time as the cost would be commensurate with the value gained.

## Enemies of the Blackberry.

Up till quite recently the blackberry was singularly free from the attacks of any natural enemy that might be of value in its control. For a number of years past several parasitic fungi, notably orange-rust (*Caeoma nitens*), have been noted as occurring sporadically, but in no cases have their effects justified the opinion that any of them would prove efficaceous as control agents. During the past two years, however, a hitherto rare native moth, *Carposina adreptella*, belonging to the Tortrix group, has been found attacking the young shoots of the blackberry. The immense numbers in which this moth has been present, and the really effective work that it has already accomplished, indicate that it may prove an exceedingly valuable agent in controlling the spread of the blackberry.

At first sight its mode of attack might lead one to think that its action would have but little permanent benefit. The eggs of the moth are laid in the leaf-bases of the young shoot or in the bud itself. The larvæ, after hatching rapidly, penetrate the soft tissue and bore through the pith for a distance of perhaps 2 in. This is followed by the complete death of the terminal shoot. As has been

explained, the blackberry spreads extensively by means of pendent branches which, when they reach the ground, root and give rise to new plants. If a blackberry-plant has the terminal portions of these branches destroyed before they reach the ground the power to spread vegetatively is entirely eliminated, and the plant remains small in size and will not be able to coalesce with its neighbours and form a dense, close thicket. This is exactly what is occurring wherever *Carposina* has attacked the plants, and, moreover, affected plants appear to be losing their power of producing flowers and fruit to anything like the same extent as unaffected ones. I believe, indeed, that *Carposina* also attacks the young flower-buds before they expand, but this is a point that has not been yet investigated. The extraordinary part in the work of *Carposina*, and one hard to believe, is that this moth should for so many years occupy such an unimportant position in our fauna, and that within the space of two seasons it should become one of our commonest insects. The number of the larvæ present on a single large blackberry-bush is almost inconceivable, and I have seen whole areas of this weed with nearly every terminal bud eaten out and destroyed. The distribution of the moth is very widespread, and in every district I have examined the effects of its work have been most noticeable. If it continues to extend there is not the least doubt that it will completely prevent the blackberry from spreading vegetatively. Present indications point to its causing a great diminution in the amount of seed produced.

At present there is great need to learn exactly its life-history, as when that has been done methods may be able to be devised whereby its action may be emphasized by artificial means.

This note on the action of the moth has been written mainly to point out the really good work that this moth is silently doing in the control of the blackberry, and to stimulate readers of the *Journal* to pay particular attention to any points that may prove of value in increasing the efficiency of this enemy of one of our worst pests.

## CO-OPERATIVE EXPERIMENTS.

In the co-operative experimental campaign of the Department this year the educational authorities of Otago have arranged to take part. At each of the district high schools under the jurisdiction of the Education Board of Otago experimental plots will be conducted in conjunction with the Department. The Board's special agricultural instructors will co-operate with the officers of the Department in this work. The Waitaki Boys' High School will also continue the good experimental work it carried on last year in co-operation with the Department, while the district high schools at Ashburton, Rangiora, and Blenheim will also conduct experiments under the Department's auspices.

# THE CULTIVATION OF THE VINE UNDER GLASS.

S. F. Anderson.

This branch of horticulture is now followed to a considerable extent in the Dominion, and is rapidly developing. It is one that attracts the amateur quite as much as the commercial grower, and when carried out with a proper regard for plant-growth cannot fail to afford the amateur recreation and pleasure and the commercial grower a profitable branch of his business.

When plants that are not indigenous are grown under glass to bring them to the perfection they attain in their native country they must have conditions, especially of temperature, as nearly as possible as those of that country. The greater number of high-class vines, or the parents of them, are among these plants. These conditions must not only be provided, but must be maintained very carefully, at all events, from the starting into growth to the cutting of the fruit—that is, nine months out of the twelve. It is in this that the amateur so often fails. He probably has to leave for business early in the day, the ventilation is not attended to, a hot sun in the spring mornings falls on leaves laden with moisture, and scalding occurs, while the daily examination for mealy-bug and mildew is neglected. The conditions of our climate are such that from the North to the middle of the South Island most of the best varieties can be grown in a cool vinery, or with very little artificial heat for the ripening of such late varieties as Gros Colman, Alicante, &c. It is with the growing of the vine in a cool-house that this article will deal.

The preparation of the ground and the construction of the vine-house having been given in the July, 1911, number of this *Journal*, I will proceed to the

## Selection of the Vines.

Where fruit is to be grown for market purposes and on a commercial scale it is recommended to devote a house to each variety. Where this can be done the earlier-ripening kinds should be raised in one, the mid-season in another, and the late in a third house. The objections to different kinds in the one house are,—

First: When an early variety such as Black Hamburgh has ripened its fruit it requires all the fresh air it can get night and day to keep it in good condition until disposed of. This treatment does not suit a

late grape like Gros Colman, which requires the heat maintained for a longer time.

Second: The wood of one vine may not be sufficiently ripened to allow of pruning all the vines in the house at one time.

Third: Some vines are more subject to diseases than others, and where grown together may communicate them to all in the house.

Fourth: In a succession of houses a much better method of working can be arranged.

Some of these objections may seem of minor importance, but on the whole I think it will be realized that one house for one variety will prove the most satisfactory for planting and working. Failing to be able to devote a house to each kind, some of the following may be grown together. It is desirable, however, that as few varieties as possible be grown in any one house:—

*Early House.*—Black: Black Prince, Black Hamburgh, Gros Maroc, Madresfield Court, Muscat Champion. White: Duke of Buccleuch, Foster's Seedling.

*Mid-season House.*—Black: Black Hamburgh. White: Ferdinand de Lesseps.

*Late House.*—Black: Gros Colman, Alicante, Lady Downes, Mrs. Pince, West St. Peters. White: Mrs. Pearson, Golden Queen, Dr. Hogg.

Black grapes command the best sale. White grapes, or what are called white, when quite fit for the table should be of an amber colour. The Duke of Buccleuch is of a greenish amber when ripe. White grapes are more subject to discolouring and bruising and do not carry so well as black, but where carriage is not an object they are well worthy of culture. The above selection has been made after visiting most of the vine-houses in the Dominion. The Muscat Champion and West St. Peters are rarely seen in northern districts, although where planted they have succeeded well. Gros Colman comes second in number of vines grown under glass, but it is rarely perfectly coloured. Many growers appear to think its proper colour is grizzly and are satisfied when it reaches that stage, whereas it should be a deep black with a heavy bloom peculiar to itself. To obtain this perfection in some localities a little artificial heat may be required. This can be obtained by the use of kerosene heaters towards the end of the ripening-period. Care must be taken, however, that the heaters are kept well trimmed to prevent smoking, that they are not placed too near any vine, and that the heat is properly distributed. A heater for every 2,000 cubic feet is about what is wanted. The Alicante also benefits by similar treatment. For small private vine-houses, where the work of looking after them is done by the handy-man or amateurs, two varieties are more satisfactorily grown than four or five, and they should be

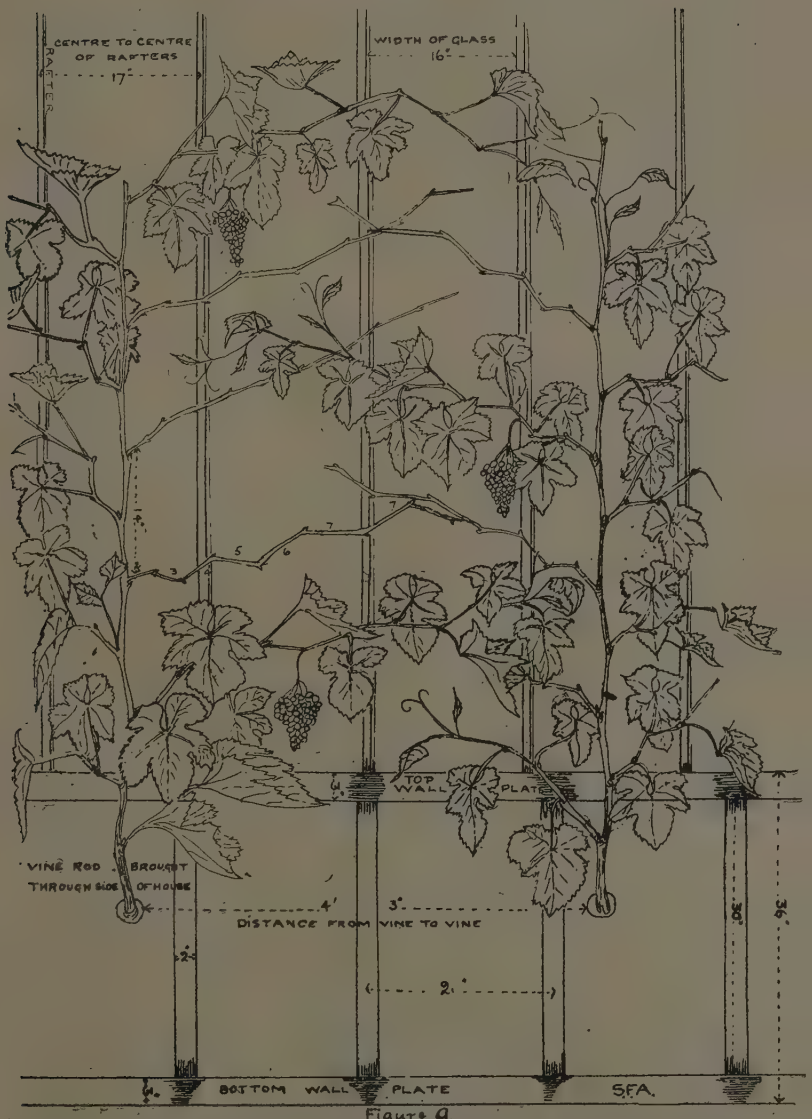



Figure 9.

Figure to show overlapping of fruit bearing laterals. Vines planted 4'-3" apart. Planted closer they are over-crowded, and the foliage cannot be displayed to the light. The foliage on three laterals only are drawn sufficient however, to show training. Measurements given in inches of the joints etc. All is drawn to scale - one inch to the foot.

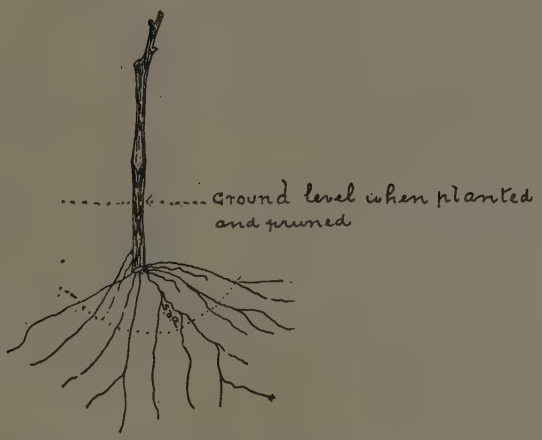
Black Hamburgh and Foster's Seedling (white). Attempting to grow a number of varieties in a house with a view to having a succession is generally disappointing under such circumstances.

It is most important that all vines be grafted upon phylloxera-resistant stocks. The experience of vinegrowers at Whangarei, Whakapirau, Masterton, and Auckland should be sufficient to convince any one of the risk run by growing them on their own roots. Plants may be procured through the Director of Fields and Experimental Farms, Department of Agriculture, Industries, and Commerce, Wellington, or, if ordered from the nurseryman, stipulation should be made that they have been worked on resistant stocks.

## Planting the Vines.

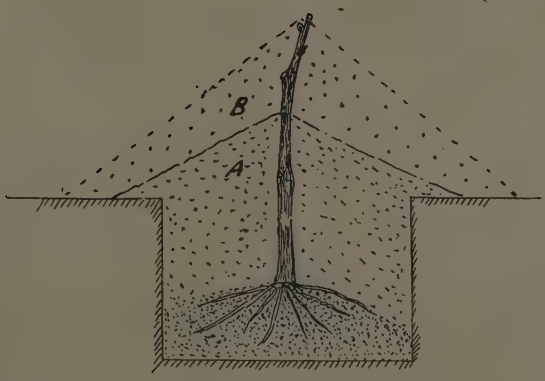
Assuming that the vine-house has been erected and the borders have been prepared as advised in the article on "The Preparation of the Ground and Construction of a Cool-vine House," the planting of the vine is the next step, and the question arises, should it be planted in the borders outside or in the house? For convenience in watering, manuring, and general cultivation, and as affording greater scope for the roots, outside planting is recommended. There are places in the Dominion where heavy frosts occur, or where the aspect is cold. In such localities no doubt the vines would be better planted inside.

The next consideration is the distance apart the vines should be placed. This depends on the number of permanent rods that are to be allowed to each vine. It is the general custom to train up a single rod from each vine. This is done because a quicker return is obtained. Where two or more rods to a vine are allowed, a corresponding length of time for the vines to become established before carrying a crop should be permitted. For instance, while a vine carrying one rod five years from planting may bear 10 lb. to 15 lb., one carrying three rods should not be allowed to bear 30 lb. or 45 lb. of fruit for another three years, making eight years from the planting. The distance apart the vines should be placed is a matter of more importance than is generally considered. To make this clear figure No. 9 has been prepared. This shows a portion of a house 51 ft. by 16 ft. inside measurement, with thirty-six rows of glass, each 16 in. wide. Allowing 1 in. between the rabbetings, or grooves, wherein the glass is laid on each of the rafters, makes the interval from centre to centre 17 in. Giving attention to the earlier-ripening vines first, the distance apart should be 4 ft. 3 in., which allows twelve vines on each side. The first will be below the second row of glass or 25½ in. from the end of the house, and the second under the fifth row of glass, the third under the eighth row of glass, and so on, the last one being 25½ in. from the other end of the house. Planting the vines this distance apart it will be seen




How the Young Vine is to be pruned and the Roots shortened before Planting.

Figure 2.




How the Vine should be planted.

A. Hill around plant covering union. B. Light earthing-up, covering the buds until they start into growth.

Figure 3.

that the laterals or side shoots that bear the fruit can only grow 25½ in. before they meet, and all growth beyond that overlaps. In most of the vine-houses in the Dominion vines are planted closer than this; the consequence is too much overlapping and overcrowding of the foliage, growers overlooking the fact that it is most important for the well-being of the vines that leaves should be displayed to the light. In the case of the strong-growing long-jointed varieties the distance should be increased to 5 ft. 8 in. apart, the first plant coming under the second sash-bar rafter and every fourth one after that. This makes nine vines to each side of the house. The laterals in this case have 2 ft. 10 in. to grow before they meet. The vines in a late house should have plenty of room. The sun-heat is decreasing just at their ripening-period, and the leaves should be so displayed that one does not cause constant shade to another. This applies particularly to Gros Colman, Alicante, Lady Downes, Golden Queen, and other late-ripening kinds. Where these strong-growing late-ripening varieties of vines are planted less than a proper distance it is too often the practice to deprive them of their foliage to a harmful extent, in order to admit light, with the result that the grapes colour badly and the vigour of the vines gradually diminishes. In the case of houses planted with earlier varieties closer planting can be done as mentioned above, as the wood is shorter-jointed, the leaves smaller, and they have the summer sun to bring them to perfection. Greater liberties in this respect can therefore be taken with the earlier than with the later varieties. If the vines are to be planted 4 ft. 3 in. apart, place the first peg 25½ in. from end of house, and, if planting in outside border, 18 in. from the wall. The second peg will be put in at a distance of 4 ft. 3 in. from the first, and so on, finishing up at 25½ in. from the other end of the house. If planting at a distance of 5 ft. 3 in., place the first peg 2 ft. 10 in. from the end of the house, and 18 in. from the wall, the second peg 5 ft. 8 in. from the the first, finishing up at 2 ft. 10 in. from the other end of the house.

When digging the hole for the vine, tap in the peg as the hole is being deepened and dig round it, leaving it, when the hole is sufficiently deep, on a slight mound in the centre. When planting draw out the peg and set the vine in its place. Spread out the roots and shake in amongst them some of the fine surface soil, then half fill the hole with good soil and press down firmly with the foot; afterwards fill the hole with loose soil. It has to be borne in mind that the vine will sink a little when the soil is pressed round the roots, so allowance has to be made for this when placing the vine in the hole. Finally, make a good hill of soil around the graft, to protect it from the sun and drying winds until it becomes well established, as shown in the illustration (see Fig. 3).

Mr. T. F. Ellis writes: "Great care is necessary to avoid setting any of the unions too deep. If the unions are placed below the

surface of the soil the scion will send out roots; if these roots are not removed they will grow large and take the nourishment coming from the leaves. This will result in the starvation and death of the resistant roots, and in a few years the vines will have no roots but those growing from the scion, and will be as susceptible to injury from phylloxera as if they had never been grafted. Owing to the union being kept covered with soil during the first few months, a few scion roots may be produced, especially in rich and moist soil. During midsummer it is necessary to draw the soil from the vines, lay bare the graft joint, and cut off any roots that may have grown on the scion. The soil should then be partially replaced, and during the early autumn be entirely cleared away, so that the joint, now exposed to the air, will harden its tissues, and be thus able to withstand the changes of weather."

For the first year the plant may be left to itself, being merely encouraged by good cultivation to grow and become established. Where it is intended that the house is to be devoted to vine-culture only, and provided that the land has been prepared beforehand and the dimensions of the house fixed, the vines may be planted two years before the house is put up, always provided that they receive proper care and training in the meantime. The third year, however, it must be ready for the rods to be brought in to carry their first lot of fruit. It has been the custom with some commercial growers to erect the house the same year the vines are planted and grow tomatoes until the third, and then bring in the vine-rods. If the vines are planted inside the house, or the rods taken in from the outside and tomatoes grown as well, care must be taken not to overshadow the young vines, or a year or more may be lost before strong rods can be obtained, the vines being shaded by the wall on one side and the tomato-plants on the other.

*(To be continued.)*

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## SUPERPHOSPHATE AND BASIC SLAG.

It has puzzled many a farmer to account for the contradictory behaviour of these two phosphatic manures. A simple explanation may assist them to understand why superphosphate shows to advantage in well-drained sweet land while basic slag has generally the advantage in land inclined to be sour. Superphosphate is an acid manure and increases the acidity of the soil. In an alkaline soil in a dry climate it should give better results than basic slag, as when applied to the soil it is water-soluble, and thus becomes completely disseminated through the ground. Basic slag, on the other hand, is an alkaline manure. When applied to a sour or acid soil the acids in the soil assist, in all probability, to dissolve the phosphates in the slag, while the lime has doubtless the effect of neutralizing the sourness of the soil and thus rendering it a better medium for the growth of plants.

# IMPORTATION OF FERTILIZERS.

B. C. Aston, F.I.C.

The following particulars of the importation of fertilizers into New Zealand for the year ended 31st March, 1912, are compiled from a return furnished by the Customs Department. The port of entry, name and quantity of fertilizer, and country whence imported are shown respectively.

### Auckland.

*Bonedust.*—New South Wales, 5,107 tons; United Kingdom, 1 ton; Bengal, 3,170 tons.
*Bone Char.*—New South Wales, 175 tons; Bengal, 100 tons.
*Bone Phosphate.*—New South Wales, 240 tons.
*Blood and Bone.*—New South Wales, 260 tons; Victoria, 10 tons.
*Basic Slag.*—United Kingdom, 6,190 tons; Germany, 822 tons; Belgium 3,865 tons.
*Superphosphate.*—United Kingdom, 4,677 tons; Germany, 865 tons; Belgium, 106 tons; Japan, 1,775 tons.
*Guano.*—Victoria, 151 tons; Malden Island, 3,500 tons; Christmas Island, 5,171 tons; Society Islands, 10 tons; Surprise Island, 600 tons.
*Sulphate of Potash.*—New South Wales, 1 ton; Germany, 344 tons; Belgium, 25 tons.
*Muriate of Potash.*—Germany, 20 tons.
*Kainit.*—United Kingdom, 218 tons; Germany, 663 tons; Belgium, 25 tons.
*Potash Salt.*—Germany, 10 tons.
*Gypsum.*—New South Wales, 65 tons; South Australia, 756 tons.
*Sulphate of Ammonia.*—New South Wales, 43 tons.
*Nitrate of Soda.*—United Kingdom, 8 tons; New South Wales, 192 tons.
*Nitrolim.*—Sweden, 15 tons; Germany, 25 tons.
*Sulphate of Iron.*—United Kingdom, 51 tons.
*Potato-fertilizer.*—United Kingdom, 25 tons.
*Turnip-fertilizer.*—United Kingdom, 250 tons; Belgium, 20 tons.

### Kaipara.

*Bonedust.*—New South Wales, 145 tons.

### New Plymouth.

*Bonedust.*—New South Wales, 250 tons.
*Superphosphate.*—United Kingdom, 200 tons; Victoria, 123 tons; New South Wales, 150 tons.
*Guano.*—United Kingdom, 90 tons.
*Basic Slag.*—United Kingdom, 1,875 tons.
*Potash Salt.*—United Kingdom, 10 tons.
*Kainit.*—United Kingdom, 50 tons.
*Gypsum.*—United Kingdom, 25 tons; New South Wales, 47 tons.

### Patea.

*Gypsum.*—Victoria, 7 tons; South Australia, 30 tons.

### Wanganui.

*Superphosphate.*—United Kingdom, 50 tons.

### Poverty Bay.

*Superphosphate.*—United Kingdom, 10 tons; New South Wales, 5 tons; Victoria, 25 tons.

### Napier.

*Bonedust.*—New South Wales, 60 tons.
*Basic Slag.*—United Kingdom, 135 tons; Belgium, 40 tons.

*Superphosphate.*—United Kingdom, 482 tons; New South Wales, 221 tons; Japan, 700 tons.
*Phosphate.*—Belgium, 55 tons; Germany, 4 tons.
*Guano.*—New South Wales, 75 tons.
*Sulphate of Potash.*—Germany, 5 tons; Belgium, 6 tons.
*Kainit.*—Germany, 15 tons.
*Potash.*—Germany, 41 tons.
*Gypsum.*—Victoria, 30 tons.
*Sulphate of Ammonia.*—New South Wales, 13 tons.

WELLINGTON.

*Basic Slag.*—United Kingdom, 2,051 tons; Germany, 50 tons.
*Superphosphate.*—United Kingdom, 1,928 tons; Victoria, 1,151 tons; New South Wales, 653 tons; Germany, 250 tons; Holland, 125 tons.
*Guano.*—United Kingdom, 1 ton; Victoria, 129 tons; Malden Island, 618 tons.
*Phosphate.*—United Kingdom, 467 tons; Victoria, 98 tons; New South Wales, 15 tons.
*Sulphate of Potash.*—United Kingdom, 36 tons; New South Wales, 1 ton; Germany, 155 tons.
*Kainit.*—United Kingdom, 58 tons; Germany, 268 tons.
*Gypsum.*—Victoria, 429 tons; New South Wales, 30 tons; South Australia, 30 tons; Germany, 10 tons.
*Sulphate of Ammonia.*—United Kingdom, 5 tons.
*Nitrate of Soda.*—New South Wales, 2 tons.
*Nitrolim.*—Norway, 15 tons.
*Grass-fertilizer.*—United Kingdom, 36 tons.
*Unenumerated.*—New South Wales, 1 ton.

NELSON.

*Basic Slag.*—Belgium, 30 tons.
*Superphosphate.*—United Kingdom, 224 tons.
*Sulphate of Potash.*—United Kingdom, 12 tons.
*Kainit.*—United Kingdom, 10 tons; Germany, 25 tons.
*Gypsum.*—Victoria, 15 tons.
*Sulphate of Ammonia.*—United Kingdom, 1 ton; New South Wales, 5 tons.

BLENHEIM.

*Basic Slag.*—United Kingdom, 20 tons.

LYTTELTON.

*Bonedust.*—Bengal, 10 tons.
*Basic Slag.*—United Kingdom, 400 tons.
*Superphosphate.*—United Kingdom, 2,220 tons; Victoria, 655 tons; New South Wales, 480 tons; Tasmania, 1,990 tons; Japan, 2,428 tons.
*Sulphate of Potash.*—Germany, 40 tons.
*Kainit.*—United Kingdom, 125 tons; Germany, 50 tons.
*Potash Salt.*—United Kingdom, 30 tons.
*Nitrate of Soda.*—New South Wales, 5 tons.

TIMARU.

*Bonedust.*—New South Wales, 97 tons; Bengal, 125 tons.
*Basic Slag.*—United Kingdom, 50 tons.
*Superphosphate.*—United Kingdom, 1,974 tons; Victoria, 1,228 tons; New South Wales, 542 tons; South Australia, 10 tons; Japan, 1,832 tons.
*Guano.*—New South Wales, 50 tons.
*Kainit.*—Germany, 105 tons.
*Potash Salt.*—Germany, 170 tons.
*Gypsum.*—Victoria, 8 tons; South Australia, 830 tons; Tasmania, 10 tons.
*Unenumerated.*—United Kingdom, 6 tons.

OAMARU.

*Superphosphate.*—United Kingdom, 50 tons; Victoria, 45 tons.

DUNEDIN.

*Bonedust.*—New South Wales, 357 tons; Bengal, 100 tons.
*Blood and Bone.*—New South Wales, 170 tons.
*Basic Slag.*—United Kingdom, 394 tons; Belgium, 40 tons.
*Superphosphate.*—United Kingdom, 330 tons; Victoria, 254 tons; Belgium, 100 tons.
*Guano.*—United Kingdom, 32 tons; Malden Island, 1,530 tons; Surprise Island, 1,621 tons; Christmas Island, 1,000 tons.
*Phosphate.*—United Kingdom, 1 ton.
*Diphosphate.*—Germany, 2 tons.
*Sulphate of Potash.*—United Kingdom, 89 tons; Germany, 75 tons.
*Kainit.*—Germany, 125 tons.
*Potash Salt.*—Germany, 245 tons.
*Gypsum.*—South Australia, 790 tons.
*Sulphate of Ammonia.*—United Kingdom, 15 tons; Victoria, 17 tons; New South Wales, 20 tons.
*Nitrate of Soda.*—New South Wales, 51 tons.
*Nitrolim.*—Norway, 5 tons.
*Sulphate of Iron.*—United Kingdom, 12 tons.
*Potato-fertilizer.*—United Kingdom, 200 tons.

INVERCARGILL.

*Bonedust.*—New South Wales, 927 tons; Bengal, 450 tons.
*Blood Manure.*—New South Wales, 175 tons.
*Blood and Bone.*—New South Wales, 195 tons.
*Basic Slag.*—United Kingdom, 125 tons; Germany, 55 tons; Belgium, 85 tons.
*Superphosphates.*—United Kingdom, 475 tons; Victoria, 2,806 tons; New South Wales, 1,178 tons; Germany, 250 tons.
*Phosphate.*—United Kingdom, 50 tons.
*Guano.*—Christmas Island, 2,069 tons; Malden Island, 2,754 tons; Surprise Island, 1,400 tons; Seychelles, 1,250 tons.
*Sulphate of Potash.*—Germany, 7 tons.
*Kainit.*—Germany, 400 tons; Belgium, 50 tons.
*Potash Salt.*—Germany, 410 tons.
*Gypsum.*—South Australia, 593 tons; New South Wales, 21 tons; Victoria, 20 tons.
*Sulphate of Ammonia.*—United Kingdom, 9 tons; Victoria, 10 tons; New South Wales, 110 tons; Germany, 56 tons.

SUMMARY.

The following is a summary of the kinds, quantities, and values of the various fertilizers imported into New Zealand during the year ended 31st March, 1912:—

| Description. | Weight. Tons. | Value. £ |
|---|---|---|
| Bonedust | 10,799 | 69,032 |
| Bone char | 275 | 922 |
| Blood manure | 175 | 1,050 |
| Bone phosphate | 240 | 817 |
| Blood and bone | 635 | 3,924 |
| Basic slag | 16,227 | 53,067 |
| Superphosphate | 32,567 | 119,597 |
| Phosphate | 690 | 2,587 |
| Diphosphate | 2 | 16 |
| Guano and rock phosphate | 22,050 | 61,622 |
| Sulphate of potash | 796 | 9,772 |
| Muriate of potash | 20 | 234 |
| Kainit | 2,187 | 7,255 |
| Potash salt | 916 | 5,235 |
| Gypsum | 5,494 | 7,604 |
| Sulphate of ammonia | 304 | 4,505 |
| Nitrate of soda | 258 | 2,725 |
| Nitrolim (cyanamide) | 60 | 626 |
| Sulphate of iron | 63 | 217 |
| Potato-fertilizer | 225 | 1,168 |
| Turnip-fertilizer | 270 | 1,140 |
| Grass-fertilizer | 36 | 152 |
| Unenumerated | 7 | 60 |
| | | £353,327 |

Importations in year ending 31st March, 1911, £270,282.

# LUCERNE DEMONSTRATIONS.

It is very gratifying that the lucerne demonstrations at Moumahaki Experimental Farm, Waerenga Experimental Farm, and Ruakura Farm of Instruction provide every promise of the successful establishment of this very valuable forage plant under varying conditions. At Moumahaki the lucerne is growing luxuriantly on the highest and most exposed situation of the farm, at Waerenga it is growing well in the poor clayey gum land characteristic of the district, and at Ruakura it is thriving amazingly on land which a few years ago was described as a miserable kahikatea swamp which would never pay for reclamation. Lucerne was sown at Ruakura on the 3rd November, 1911; it was mown four times during the summer and autumn of the past season, and the 9-acre crop has now a dense growth of fully 20 in. high. These instances amply demonstrate that lucerne can be grown successfully in the most varied types of soil, providing it receives reasonable cultivation and intelligent treatment. The demonstrations, it is very satisfactory to know, have induced many farmers to take up lucerne-growing on a practical scale.

At Ruakura many varieties of lucerne are being tested. These comprise, among others, Arabian, Peruvian, Provence, Hungarian, Turkestan, Hunter River, and Marlborough (New Zealand). Of these the last-named is decidedly prominent. The Department has also been fortunate in securing three varieties of Siberian lucerne (*Medicago falcata*), which were sown last season. Vigorous plants resulted, and these are now under observation. From the whole of the above varieties the Department anticipates that it will in the future be in a position to indicate a suitable variety for almost all descriptions of soil found within the Dominion.

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## STACK ENSILAGE.

Farmers desirous of obtaining expert advice on the making of ensilage during the coming season are requested to forward their full names and addresses to the Director of Fields and Experimental Farms, Department of Agriculture, Industries, and Commerce, Wellington, at the same time giving particulars as to the variety and acreage of the crop which it is proposed to deal with.

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Soil should be well drained, in good tilth, and contain a good supply of humus and lime before any attempt is made to enrich it by chemical fertilizers.

THE DANISH UNIVERSAL REGENERATIVE PASTEURIZER.

For pasteurizing the whole milk. This does away with the necessity of pasteurizing the cream and skim-milk separately.

# DAIRYING IN EUROPE.

## INCREASING COST OF PRODUCTION: IMPORTANT DEVELOPMENT IN FACTORY MACHINERY.

J. Pedersen.

The business of milk-production in Europe is steadily expanding, but it is requiring a keener intelligence on the part of the farmer to make it as profitable as in former days, even taking into account the higher prices which have ruled in recent years for the commercial product. The cost of feeding is enormous, and the price of commercial foodstuffs, such as linseed cake, sunflower cake, cotton-seed cake, &c., is steadily increasing; in fact, so heavy is the drain on the farmer's returns by reason of the present cost of these concentrated foodstuffs—which are fed in the summer as well as in the winter—that many farmers, and these amongst the more progressive, are finding it profitable to reduce the extent of their artificial feeding, even though in the process the yields of their cows are lessened. In making any comparison between the yield of Continental cows and those of this country the high cost of production in connection with the milk of the former should be remembered; as were, say, Danish cows fed on the same principle as is in vogue in this country the returns would be certainly considerably less. So high is the cost of cow-feeding in Denmark that the better part of the profit is made from the progeny and the by-products; skim-milk is a common article of human consumption. While the Home farmer has to face increasing cost of production he is counteracting this to a most appreciable extent by systematic testing of his herd, so that not only may the unprofitable animals be eliminated and the best breeding stock be disclosed, but the testing officer provides him with accurate information as to the actual cost of producing the milk of each individual animal. This more complete testing as to milk and fat returns, together with the expenditure on food, calculated to unit values, is not necessary in a country like New Zealand, though here the lessons from herd-testing may not improbably be of greater value to the farmer.

The principal advance in dairying in Europe, apart from the marked improvement taking place in the standard of milking-stock through herd-testing, is in the splendid progress apparent in Sweden and Denmark in dairy machinery. This particularly applies to the economies

A Danish Dairy and Casein Factory.

A Siberian Butter-factory.

being effected in the process of pasteurization of skim-milk as well as of cream. A system being largely adopted is to pasteurize the whole milk, so that the necessity of separately treating cream and skim-milk is done away with. This is effected on the regenerative system; and it is claimed that by applying this principle to whole milk the cost of pasteurization is reduced to a minimum. The cooler system, recently introduced in the Kairanga Factory—where the whole milk is heated to about 130° by passing over the outside of a Lawrence type of cooler, over the inside surface of which the skim-milk, heated by exhaust steam, flows on its way to the skim-milk tank—has been increasing in popularity in Denmark during the last five years. It is contended that this system effects a saving in coal on the former methods of about 40 per cent.

The apparatus for starter-making in use in Danish factories is considerably in advance of that in use in this country. With the Danish starter-can the temperature of the milk can be effectively controlled during the entire ripening process. It is built on the same principle as a pasteurizer, having a double jacket, the heating and cooling being effected by hot and cold water being run alternately through the one jacket.

I was very much taken with a new froth-destroying pump now being used in Denmark. It has quite eliminated the froth difficulty with skim-milk. The pump can be used for any purpose, and is only the same cost as one of ordinary design.

A new separator being introduced in Denmark, the "Titan," is competing successfully against the established makes. The combined churn in use there has a stationary worker inside, considerable room in the factory being thereby saved.

A great improvement is taking place in the type of factory building on the Continent. As the dairying industry is now on a solid foundation, better buildings, equipped in the most up-to-date manner, are replacing many old obsolete structures. Even in Siberia the class of factory being constructed is up to date in every respect.

The prospects of butter in Europe have never been so good. Germany is every year increasing her consumptive power, and, I believe, will in the near future be a good customer for New Zealand butter. Certainly, there is a duty of 1d. a pound on butter entering Germany, but the retail price is invariably higher than on British markets. As there is no duty on cream, Danish skimming-stations on the border are increasing their shipments of cream to German butter-factories. Germany is also absorbing more Siberian butter. The population of Germany, it may be remarked, is increasing at the rate of a million souls a year. Ten years ago Germany was exporting butter; to-day she is importing nearly four times as much as the total export of New

A Group of Danish Cattle.

The returns from these cows were as follows: No. 1 averaged 8,814 lb. of 3·7 milk for ten years; No. 2 averaged 8,593 lb. of 3·6 milk for four years; No. 3 averaged 7,907 lb. of 3·8 milk for three years; No. 4 averaged 8,556 lb. of 3·5 milk for two years; No. 5 averaged 7,214 lb. of 3·6 milk for one year.

Zealand. The tendency of Germany is also the tendency of several other Continental countries. France, Italy, and even Switzerland cannot now meet the demands of their own consumers. All this points to the fact that butter-values will be well maintained in the future, and that New Zealand dairy-farmers can have every confidence in establishing the business of milk-production on a more permanent basis. As long as quality is maintained, New Zealand butter has a splendid future before it.

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## THE DEPARTMENT'S HOLSTEIN IMPORTATIONS.

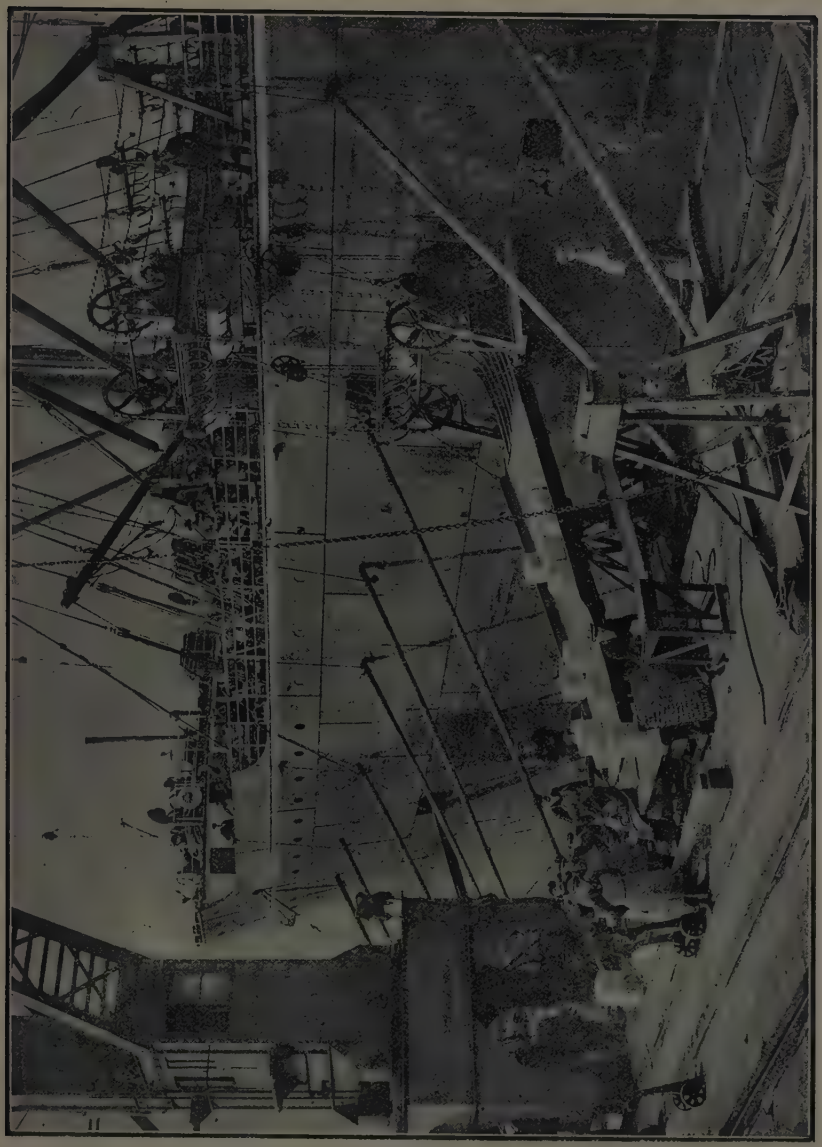
### REMARKABLE MILK-RECORD PEDIGREES.

In reporting on the Holstein stock — a bull and four heifers — he purchased in the United States on behalf of the Department, Mr. W. M. Singleton, Assistant Director of the Dairy-produce Division, says,—

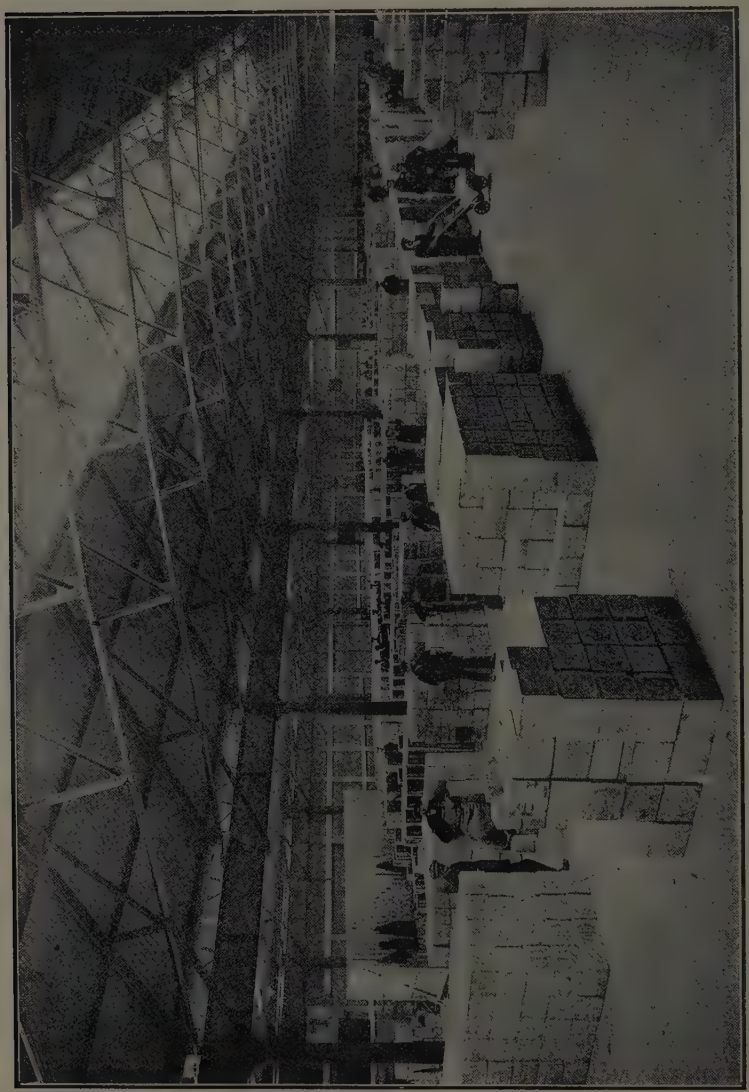
"The individuals selected for the Department are undoubtedly among the best in North America, and have come from ancestry which has proved capable of producing quantities of milk and butter-fat equalled by few cows of this or any other breed. The two grandams of the bull have each held the world's record for long-period tests — Colantha 4th Johanna having held the world's yearly record with 998·26 lb. butter-fat, while Pietje 22nd some years since made a six-months official record of over 453 lb. butter-fat. The dam of the bull is now in semi-official record, and will make a nice showing when her lactation period is completed.

"Of the heifers, three are daughters of that noted bull Homestead Girl de Kol's Sarcastic Lad, a sire with perhaps more yearly tested daughters than any other of the breed. The yearly record of many of these are exceedingly high, some being considerably over 700 lb. fat from animals much under mature age. It can certainly be said of this bull that he has proved his dairy prepotency through his stock—the greatest of all tests for any sire.

"On the dams' side these three heifers are not without good record backing for the whole lactation period. The grandams of two of them have produced 724 lb. and 694 lb. fat respectively in one lactation period not exceeding 365 days. The dam of one heifer has produced 571 lb. fat, and this under unfavourable circumstances for a portion of the time. The dam of the third heifer will be in semi-official test during her ensuing lactation period, and should certainly 'make good.' Her sister, now in semi-official test,



Landing New Zealand Butter by Travelling Crane in London Docks.



Butter Warehouse at Ship's Side, London.

*By courtesy of Messrs. W. Weddel and Co.*

has in 188 days produced 12,478 lb. milk containing 414 lb. fat. It is the dam of these sisters that produced the 724 lb. fat record.

"The fourth heifer has on the dam's side a strong semi-official backing. Her grandam has to her credit 21,952 lb. milk containing over 694 lb. butter-fat. The dam of this heifer is now in semi-official test as a junior four-year-old, and has in 235 days produced over 505 lb. butter-fat, and is still 'going strong.' A full sister to the grandam was also in semi-official test at the time of my visit, and had produced in 264 days 15,265 lb. milk and 525 lb. fat. On the sire's side the grandam has no yearly record, but did for a time hold the world's record for a week's production of butter at over 35 lb.

"Those who still place a good deal of importance on weekly official tests will be interested to know that twelve dams in the ancestry of this heifer's calf have averaged 27·30 lb. of butter in one week."

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The membership last year of the British Holstein Cattle Society was about fifty, but at the end of the year it had been doubled. Two months ago the number of members on the books was 164.

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At Ruakura Farm of Instruction, as, indeed, over a great part of the Dominion, the spring has been exceptionally wet and windy. As a result the spring grass has not provided a proper milk-producing ration. The Ruakura herd, therefore, is receiving a liberal allowance from a crop consisting of green oats and peas. The response in milk is eminently gratifying.

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## THE DEPARTMENT'S HERDS.

### AVERAGE RETURNS OF 1911–12 SEASON.

Following are the breed and average individual milk and butter-fat returns of the Department's purebred dairy herds for the past season:—

| Name of Farm. | Breed of Cattle. | Number of Animals. | Average Number of Days in Milk. | Average Yield of Butter-fat. | Remarks. |
|---|---|---|---|---|---|
| | | | | lb. | |
| Weraroa .. | Holsteins .. .. | 19 | 306 | 419·893 | .. |
| | Holsteins .. .. | 4 | 190 | 148·66 | Heifers. |
| | Shorthorns .. | 6 | 308 | 340·41 | |
| | Illawarra (New South Wales) Shorthorns | 5 | 95 | 75·556 | Heifers. |
| Ruakura .. | Jerseys .. .. | 9 | 306 | 333·85 | .. |
| | Jersey .. .. | 1 | 302 | 223·4 | Heifer. |
| | Shorthorns .. | 7 | 277 | 328·5 | .. |
| Moumahaki .. | Ayrshires .. .. | 5 | 286 | 328·789 | .. |
| | Ayrshire .. .. | 1 | 313 | 183·33 | Heifer. |

## WERAROA EXPERIMENTAL FARM.

| Breed. | Name of Cow. | Period Milking. From | Period Milking. To | Number of Days. | Total Milk-yield. | Average per Day. | Best Day. | Best Week. | Test. | Total Fat. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1912. | 1912. | | lb. | lb. | lb. | lb. | | lb. |
| Illawarra Shorthorn .. | Ladybird* .. .. | June 24 .. | July 31 .. | 37 | 901 | 24·3 | 25½ | 173 | 4·2 | 37·842 |
| | Ruby* .. .. | „ 16 .. | „ 31 .. | 45 | 788½ | 17·5 | 22½ | 135½ | 3·8 | 29·944 |
| | Flora* .. .. | „ 14 .. | „ 31 .. | 47 | 1,295 | 27·5 | 34 | 228 | 4·2 | 54·390 |
| | Esther* .. .. | April 4 .. | „ 31 .. | 118 | 2,575 | 21·8 | 27½ | 183 | 4·0 | 103·000 |
| | | 1911. | | | | | | | | |
| | Illawarra* .. .. | Dec. 13 .. | „ 31 .. | 231 | 4,769½ | 20·6 | 27½ | 188½ | 3·2 | 152·608 |
| Shorthorn .. .. | Lou .. .. | Oct. 29 .. | June 21 .. | 236 | 7,037½ | 29·8 | 49½ | 339½ | 3·3 | 232·221 |
| | Violet .. .. | Sept. 25 .. | July 28 .. | 307 | 11,519 | 37·5 | 61½ | 424 | 4·0 | 460·760 |
| | Mack .. .. | „ 18 .. | „ 7 .. | 293 | 10,938½ | 37·3 | 57½ | 393½ | 3·7 | 404·706 |
| | Rachael .. .. | „ 13 .. | June 7 .. | 268 | 8,321¼ | 31·0 | 45 | 306 | 3·5 | 291·235 |
| | Pansy .. .. | „ 10 .. | July 7 .. | 301 | 7,929½ | 26·3 | 43 | 281 | 3·6 | 285·444 |
| | Star Rose .. .. | Aug. 4 .. | „ 14 .. | 345 | 11,503½ | 33·3 | 51 | 346½ | 3·2 | 368·096 |
| Holstein .. .. | Mierlo (heifer)* .. | Dec. 30 .. | „ 31 .. | 214 | 6,467½ | 30·2 | 39½ | 257½ | 3·1 | 200·477 |
| | Freda* .. .. | Nov. 27 .. | „ 31 .. | 247 | 7,119½ | 28·8 | 43½ | 277 | 3·5 | 249·165 |
| | Barbe* .. .. | Dec. 5 .. | „ 31 .. | 239 | 11,527 | 48·2 | 71 | 486 | 3·3 | 380·390 |
| | Dinah* .. .. | Nov. 22 .. | „ 31 .. | 252 | 8,176½ | 32·4 | 50½ | 334 | 3·7 | 302·512 |
| | Nana* .. .. | „ 27 .. | „ 31 .. | 247 | 12,669 | 51·3 | 70 | 483 | 2·7 | 342·063 |
| | Diana* .. .. | Oct. 24 .. | „ 31 .. | 281 | 10,816 | 38·4 | 52 | 350½ | 3·4 | 367·744 |
| | Julia .. .. | „ 19 .. | „ 7 .. | 262 | 10,449½ | 39·9 | 63 | 432 | 3·0 | 313·470 |
| | Domino V* .. .. | „ 11 .. | „ 31 .. | 294 | 12,103½ | 41·1 | 61 | 404 | 3·2 | 387·296 |
| | Gretchen .. .. | „ 8 .. | June 21 .. | 257 | 10,771¼ | 41·9 | 79 | 529 | 3·3 | 355·443 |
| | Greba .. .. | Sept. 29 .. | July 28 .. | 303 | 10,455 | 34·5 | 52 | 359 | 3·1 | 324·105 |
| | Johanna* .. .. | „ 23 .. | „ 31 .. | 312 | 12,763¼ | 40·9 | 62½ | 420½ | 3·5 | 446·705 |
| | Chloe* .. .. | „ 14 .. | June 21 .. | 281 | 8,668½ | 30·8 | 54 | 361 | 3·2 | 277·376 |
| | Lurli* .. .. | „ 17 .. | July 31 .. | 318 | 14,388½ | 45·2 | 77½ | 533 | 3·0 | 431·640 |
| | Lorene (heifer) .. | „ 10 .. | June 14 .. | 278 | 4,366 | 15·7 | 31 | 202 | 3·3 | 144·078 |
| | Flower* .. .. | „ 6 .. | July 31 .. | 329 | 12,738 | 38·7 | 66 | 437 | 3·0 | 382·140 |
| | Domino III* .. .. | „ 5 .. | „ 31 .. | 330 | 20,458½ | 62·0 | 113¼ | 664 | 3·4 | 695·572 |
| | Mary .. .. | „ 3 .. | „ 7 .. | 308 | 12,844¼ | 41·7 | 73 | 467 | 3·7 | 475·228 |
| | Spot IV* .. .. | Aug. 8 .. | „ 31 .. | 358 | 15,295 | 42·7 | 65½ | 452 | 4·3 | 657·685 |
| | Lenore* .. .. | Dec. 26 .. | „ 31 .. | 218 | 10,400½ | 47·7 | 65 | 446 | 3·4 | 353·600 |
| | Manola* .. .. | July 31 .. | „ 31 .. | 366 | 20,353½ | 55·6 | 82 | 531½ | 3·1 | 630·943 |
| | | 1912. | | | | | | | | |
| American Holstein Heifers.. | Jessie Fobes* .. | Mar. 18 .. | „ 31 .. | 135 | 5,310½ | 39·3 | 46½ | 310½ | 3·1 | 164·610 |
| | Lady Blanche* .. | „ 21 .. | „ 31 .. | 132 | 2,725½ | 20·6 | 27 | 180½ | 3·1 | 85·475 |

* Still milking.

## RUAKURA FARM OF INSTRUCTION.

| Breed. | Name of Cow. | Age. | Period Milking. From | Period Milking. To | Number of Days. | Total Milk-yield. | Average per Day. | Best Day. | Best Week. | Test. | Total Fat. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1912. | 1912. | | lb. | lb. | lb. | lb. | | lb. |
| Jersey .. | Wild Briar .. .. | 6 | July 22 .. | June 1 .. | 316 | 5,836·5 | 18·4 | 31 | 214·4 | 5·6 | 326·80 |
| | Little Fancy .. .. | 10 | ,, 29 .. | ,, 22 .. | 330 | 6,026·1 | 18·2 | 25 | 171·1 | 5·0 | 301·30 |
| | Mayflower .. .. | 3 | Aug. 6 .. | ,, 22 .. | 322 | 6,455·5 | 20·0 | 27 | 187·8 | 5·6 | 361·50 |
| | Cherry's Blossom† .. | 2 | ,, 26 .. | ,, 22 .. | 302 | 4,469·5 | 14·8 | 19 | 126·1 | 5·0 | 223·40 |
| | Ruby's Buttercup* .. | 4 | ,, 26 .. | ,, 22 .. | 302 | 6,879·1 | 22·7 | 36 | 248·8 | 5·6 | 385·20 |
| | Lady Ida* .. .. | 10 | Sept. 2 .. | July 31 .. | 334 | 7,565·1 | 22·6 | 36 | 247·8 | 5·3 | 400·90 |
| | Glenora* .. .. | 2½ | ,, 9 .. | ,, 31 .. | 327 | 5,411·8 | 16·5 | 26 | 179·8 | 5·6 | 303·00 |
| | Eureka* .. .. | 9 | Oct. 14 .. | ,, 31 .. | 292 | 7,843·0 | 26·8 | 42 | 290·1 | 4·8 | 376·40 |
| | Mayblossom III .. .. | 8 | Sept. 9 .. | June 1 .. | 267 | 5,107·5 | 19·1 | 41 | 284·2 | 4·9 | 250·20 |
| | Fury's Princess* .. | 4 | Nov. 11 .. | July 31 .. | 264 | 6,370·5 | 24·1 | 40 | 271·0 | 4·7 | 299·40 |
| Shorthorn .. | Ada* .. .. .. | 7 | Sept. 9 .. | ,, 31 .. | 327 | 9,719·8 | 29·7 | 55 | 379·2 | 3·8 | 369·30 |
| | Adelaide‡ .. .. | 5 | June 13 .. | June 15 .. | 369 | 11,237·6 | 30·4 | 40 | 271·4 | 3·9 | 438·20 |
| | Bean*‡ .. .. .. | 7 | Oct. 21 .. | July 31 .. | 285 | 9,411·9 | 33·0 | 55 | 373·1 | 3·5 | 329·40 |
| | Penrose .. .. | 7 | Nov. 4 .. | June 22 .. | 232 | 9,338·2 | 40·2 | 65 | 452·0 | 3·9 | 364·10 |
| | Norah* .. .. .. | 5 | ,, 11 .. | July 31 .. | 264 | 7,213·2 | 27·3 | 45 | 309·1 | 3·9 | 281·30 |
| | Dewlap*‡ .. .. | 8 | Dec. 25 .. | ,, 31 .. | 220 | 6,351·7 | 28·9 | 42 | 287·8 | 3·5 | 222·30 |
| | Ivy* .. .. .. | 7 | Nov. 29 .. | ,, 31 .. | 246 | 7,765·4 | 31·5 | 60 | 359·4 | 3·8 | 295·00 |

## MOUMAHAKI EXPERIMENTAL FARM.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ayrshire .. | Dominion Jewel .. .. | 9 | Aug. 5 .. | June 30 .. | 331 | 8,490·0 | 25·6 | .. | 289·0 | 5·07 | 430·443 |
| | Dominion Agnes II (heifer) | 2 | Sept. 23 .. | July 31 .. | 313 | 5,238·0 | 16·7 | .. | 195·0 | 3·5 | 183·330 |
| | Dominion Veda .. .. | 11 | ,, 23 .. | ,, 31 .. | 313 | 9,477·0 | 30·2 | .. | 392·0 | 3·6 | 341·172 |
| | Dominion Birthday .. | 9 | Oct. 14 .. | ,, 31 .. | 291 | 9,157·0 | 31·4 | .. | 385·0 | 3·9 | 357·123 |
| | Dominion Mayflower .. | 10 | ,, 7 .. | ,, 7 .. | 274 | 6,535·0 | 23·8 | .. | 319·0 | 3·3 | 215·655 |
| | Dominion Harebell .. | 10 | Dec. 23 .. | ,, 31 .. | 222 | 7,883·0 | 35·5 | .. | 322·0 | 3·8 | 299·554 |

* Still milking. † Heifer, first calf. ‡ Yield reduced through lameness and injured quarters.

NEW ZEALAND BUTTER IN GERMANY, SHOWING HOW OUR BUTTER WAS INTRODUCED TO CONTINENTAL MARKETS LAST SEASON.

*By courtesy of Messrs. W. Weddel and Co.*]


New Zealand Butter being displayed in an Italian Provision-shop Last Season.

## BLOOD-POISONING IN SHEEP.

Some loss is annually occasioned at docking and shearing owing to blood-poisoning, due to the entrance into the animal's system, through wound or abrasion, of a microbe (the malignant œdema bacillus), found in the soil and in many dirty yards. Having gained entrance into the blood-stream, this germ rapidly increases and ultimately produces gangrene or death of the part first affected, and finally death of the animal. As preventive measures are the only practical means of dealing with the trouble, farmers should see to it that the places where docking and shearing are carried on are as clean as possible, and that if they have previously had the disease on their farms the top soil of the yards should be carted away to a safe place and the fresh surface be saturated with a strong solution of some non-poisonous disinfectant sheep-dip and new soil put down. The battens, floor, and walls of the sheds should also be thoroughly cleared and a strong hot limewash applied to them, which should be mixed with a disinfectant solution of non-poisonous dip in the proportion of 1 in 30. The carcase of any affected animal which has died should be at once buried deeply or burnt. Where a sheep is cut in shearing a little tar or other antiseptic should be at once applied to the wound, and in docking and castrating carbolized oil (strength 1 in 12) should be applied to the wounds on the scrotum and tail before releasing the animal. Docking and tailing knives should be thoroughly clean, the surest plan being to immerse the blades in boiling water before use. On the recommendation of the Live-stock Division many farmers now carry out the operation of docking and tailing lambs in temporary yards formed by hurdles in a clean paddock. This has proved an excellent and reliable means of avoiding trouble through blood-poisoning.

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## DODDER IN RED-CLOVER SEED.

A. H. Cockayne.

A large quantity of the red-clover seed — and this applies also to that sold under the name of cow-grass — at present on the market contains a good deal of dodder. From an examination of samples most of this seed appears to be of either North or South American origin. Farmers are advised to pay particular attention during the present season in the purchase of red clover to make sure that no dodder is present.

# THE HEMP INDUSTRY.

W. H. Ferris.

Everything points to this season proving one of the busiest and most profitable periods in the history of the industry. All available phormium will be milled, as the splendid values ruling for fibre must induce millers to produce to the maximum capacity of their works. It is, therefore, satisfactory to know that on the whole the leaf is abundant, and generally is in good condition. A certain proportion is exhibiting a diseased appearance, but the percentage of this is not so high as was at first thought to be the case.

The fibre reaching Wellington from the Manawatu is of a rather poor colour, owing to the wet weather, flooded rivers, and damp condition of the bleaching-fields. In some cases millers are wisely sorting out and baling separately the discoloured hanks. Owing to this temporary trouble the percentage of "good-fair" grade was rather low last month. The work of stripping has been of a good standard, though in several instances it has been unsatisfactory to note that where really good leaf has been procurable the stripping has been weak, thus reducing what should have been good-fair fibre to only a fair grade. In a number of instances the scutching has been rather erratic, the want of uniformity quite discounting the good scutching and being responsible in more than one case for a reduction in grade. In some cases "slip tails" have been rather common. Here more careful stripping and clipping is required, as it is impossible at this time of the year to scutch these hard, thin tails. Slip tail is very much objected to by manufacturers. With improved weather-conditions, and with the mill staffs settled in their stride, no doubt these weaknesses will disappear.

Considerable activity will be seen in both Marlborough and Canterbury this season — districts where for some years the industry has been languishing. This is indeed gratifying, as these districts are capable of providing the best grades of our native fibre. The mills in both districts are being brought up to date by installation of the improved strippers and the several labour-saving appliances which are in use in the North Island.

Some millers do not take the care they should in loading their fibre. It is too often put into wet and dirty trucks, and thus

presents an unsightly appearance when it reaches the grading-stores. Though the grade is not affected, the unfavourable impression it will no doubt create on reaching the market in the mind of the oversea buyer is hardly likely to prove an advertisement for phormium-fibre.

Several millers in the Manawatu are wisely sorting out badly diseased leaf, and are thereby securing a high-pointed good-fair grade. Where this is not done it is seldom the hemp can be awarded more than a fair grade.

The reported drought in the Philippines is doubtless responsible for the high values ruling for phormium-fibre. If the drought proves to be as serious as anticipated, the opportunity for New Zealand millers to introduce their fibre into new channels will be unique. The need, therefore, of maintaining a high standard is of vital importance. It is not the immediate profit that has to be considered, but the future profitable trade connection. If phormium is to replace manila the quality must be the best we can turn out, as it is a matter of displacing a naturally superior fibre in the cordage-manufacturing world. It is very difficult securing information as to the condition of abaca plantations in the Philippines. In the September issue of the Philippine *Agricultural Review* (published by the Government) the latest temperature and rainfall statistics are for the month of June, and no indication is given of the weather since that month. Reporting on the exports of the islands for the fiscal year of 1912 (ending in June) the *Review* says,—

"Abaca (manila hemp) dropped from 165,649,626 kilos in 1911 to 153,986,928 kilos in 1912. This loss of 7 per cent. in quantity was offset by a rise of 8·5 per cent. in unit price, which brought the value of the 1912 export up to 32,567,020 pesos,* which is an increase of 1 per cent. over last year's value. The advance in the unit price of abaca is due to an increased demand for the fibre. The loss in the quantity of abaca exported is due mostly to the abandonment of some of the abaca fields and their conversion into use for other crops."

* Peso = 2s. 1d.

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## APPRECIATION.

Many congratulatory letters continue to be received from subscribers. These are greatly appreciated. The thanks of the *Journal* staff are specially due to those who have persuaded neighbours to become subscribers. One satisfied reader writes: "Last year I practically lost the most of the prairie-grass I sowed in a 14-acre paddock through not knowing how to put it in, but, thanks to a hint in the *Journal*, my last sowing was very successful. My first loss was equal to 500 years' subscription."

# THE APIARY.

## NOTES FOR NOVEMBER.

F. A. Jacobsen.

The successful conduct of a colony is most effectively managed when nature is followed as closely as possible; indeed, the more the wonderful habits of the bee are studied and observed, and the management made to harmonize with the bee's own strict rules of life and work, the greater the pleasure we will derive from our industry and the more profitable will our work become.

In the natural course of events the nature of a colony changes when too little space is allowed for breeding purposes, or when a queen fails in the capacity of mother. It is on these two important facts that the financial success of bee-culture mainly depends. The successful beekeeper is he who can best control and counteract these weaknesses in bee-life.

Through the month of November colonies should be judiciously handled, and signs of swarming be met in the manner likely to give the best results. Many beekeepers prefer to increase in the natural way, in which case the colony should be allowed to swarm and a note be taken of the hive from which it issues. One swarm is sufficient for any colony to expel. Therefore when the bees have settled down in the parent hive proceed to cut out every queen cell but one, always leaving as near as possible the largest and best shaped. Swarms have been known to issue in the South Island as early as the 8th of October, but this has been due to a warm early spring continuing on well into summer. Judging by present weather-indications there is every prospect of a late swarming season. To build on this, however, would be foolish, and everything should be in preparation for the natural increase considerably before the time arrives. A swarm always seems to do best on sheets of foundation, and these are to be preferred to drawn combs. The bees leave their hive with the intention of building a new home, and foundation meets their desire, lending itself to work and breeding industry. It is a matter of a very short time, sometimes less than a week, before the ten sheets are drawn into beautiful straight combs, the centre ones filled with eggs and larvæ, the top bars being edged with new honey. Not to check the working fever a super is added, and work then proceeds apace.

After cutting the unnecessary queen cells from the old hive it may be found expedient to add a super, thus making room for the expansion of the colony and retarding any further desire to swarm. The ripe cell left will probably hatch in a few days, and, providing weather-conditions are favourable, the young virgin will be mated and will commence laying within several days after having gone forth on her wedding flight. Thus the colony regains a queen to perpetuate and extend the race.

### ARTIFICIAL INCREASE.

Many methods are in vogue relative to what is commonly termed "increase." The word "increase" in this case means adding to the number of colonies. Strong stocks are built up by early feeding and are then divided, the portion containing the old queen being removed to a new location. As nearly as possible an equal part of brood and stores is given to each, and the remaining space is filled with frames of foundation. Early queens must be reared and introduced to the half that is queenless, or, failing this, a ripe cell should be inserted. For rapid increase this method is perhaps the best known in bee-culture and is highly recommended. Always remember a good spring is necessary to ensure the young queens mating in time. If a large number of colonies are required those already divided may be further fed with sugar syrup or sealed stores until sufficient strength has been gained for a second division. Just here judgment is required as to whether some stocks are too weak for a second division, for only the very strong should be so broken down.

### TO CONTROL SWARMING.

There is one method of swarm-control that gives little trouble and is highly effective. It comprises a lessening of the brood in the brood-chamber, thus always leaving plenty of room for the queen to lay. Combs of larvæ are shifted to an upper story above a queen-excluder, and are replaced by empty ones. This is continued through the swarming season. In commercial bee-culture it is always necessary to use young queens. They are essential to prosperity and the effective working of this system.

### GENERAL.

As pointed out on a previous occasion, it is advisable at this time of the year to leave room for the bees to expand their work. Nothing is so objectionable to a good beekeeper as to see a colony loafing outside the hive, as they do when the inside is cramped. Give building-room and plenty of it, and with a vigorous queen it is wonderful what will be accomplished in the work of extension.

# THE FARM GARDEN.

W. H. Taylor.

## Vegetable Culture.

By the time this is issued most people will have their broccoli sown. Any one not having done so may still venture to sow. As a matter of fact, broccoli may be sown up to the middle of November, but I have thought it advisable to start earlier than I would otherwise do in order to secure good growth before the advent of the diamond-backed moth, for when small plants are attacked it is almost impossible to save them. Any one desiring to provide cuttings of green sprouts well into the spring, after cabbages are done, might try "Purple Sprouting broccoli." The name is very misleading, for there is really very little of the broccoli about them. They are much more like Thousand-headed kale. They are, however, of special value in parts subject to heavy falls of snow, as they are not injured thereby, whereas the true broccoli are sometimes destroyed. Hard frost improves them by making the sprouts tender. For this reason they may be valuable in the southern parts of the Dominion, though they may prove worthless in the North. Sow the seed during the next two or three weeks.

*Parsnips*, and the main crop of carrots, should be sown within the next three weeks. The best time to sow naturally varies somewhat in different localities. Open, flat country enjoying a long day of sunshine will bring crops on quicker than where hills cut off the sun for a part of each day. Again, some soils retain moisture better than others. Where the soil gets dry early in summer it is necessary to start crops earlier than in more favoured places, because unless some growth is made before the dry weather sets in development will be retarded. These variations can only be allowed for by local experience and observation. Regarding carrots, the usual practice is to provide for early summer wants by sowing a small breadth of an early kind and thinning them out as wanted for use rather than by a systematic thinning. The reason for this practice is easily explained, and will make it clear why a regular thinning should not be resorted to, and also why a comparatively small bed ensures a sufficient supply for early use. In many places the most careful gardener cannot get his earliest crop fit for use until some time after the winter crop is unfit for use; therefore the new crop is brought into use while the roots are quite small. By pulling here and there along a line suffi-

cient thinning will be done to allow for the increasing size of those left, and gradually the whole bed may be used up, none at all having been lost by thinning. I have long regarded this small bed of early carrots as the most profitable patch of ground in the garden, for it is astonishing what a quantity it produces.

*Why Seed should not be sown too deeply.*—Every one knows that seed should not be sown too deep, but what constitutes too great a depth is not so clearly understood, nor is the reason why. Many things we have long known to be good practice without very clearly understanding why. We are usually satisfied to know a thing is so because we have proved it, but when one undertakes to advise others the definite reason why is looked for. Modern scientists are throwing light on many places hitherto in partial darkness. Percival, in "Agricultural Botany," makes it clear why it is important not to sow seed too deeply, and also, incidentally, precisely why it is of such importance to work the soil into a fine and even surface before sowing small seeds. "Seeds," says Percival, "contain a certain amount of reserve food, on which the young plants live for a period long enough to enable them to form a root, stem, and several leaves. This reserve food being exhausted, they must seek their food in soil and air, and unless this is readily available the plants suffer hunger. Especially is this the case with small seeds, whose store of food becomes almost exhausted before the plants are sufficiently developed to carry on their work properly. If the seeds are planted too deeply a large amount of the reserve food is used up in producing a longer stem before they reach the air." It is easy to understand that in such circumstances a serious check takes place. This also shows how very necessary it is to have the soil properly prepared, so that the young seedlings may easily force their way to the surface, and makes it clear why when seeds are put in ill-drained ground, and linger owing to the cold unfavourable conditions, they sometimes die out altogether; and not infrequently the seed is condemned as bad. The cultivator, whether hoe or machine, should be in frequent use among springing crops. Later on, when the weather is warmer and roots penetrate more rapidly into the warmer soil, this may be neglected to a degree that would prove disastrous to earlier crops. The character of the soil is also an important factor in determining the amount of cultivation necessary. Soils that run together readily and form a crust after heavy rain require frequent stirring. Always wait, however, till the surface is dry, or working it may do more harm than good. The soil should be always open, so as to enable air to penetrate and carry plant-food to the roots, as well as act on properties in the soil and convert them to the uses of the plants. A crop of onions will advance much more rapidly if the surface soil is kept loose than it will if the soil gets caked about the plants.

*Tomato-plants* should be well hardened before planting them out. After being well grown under glass they should be placed in a sheltered but sunny position. Here they quickly assume a quite different character, becoming tough in stem and leathery in foliage. Planting out should be left till frost is over, and those growing for home use will find it better and more profitable to wait till that danger may reasonably be expected to be past, rather than risk losing the plants in the attempt to get early fruit, for except special precautions are taken to protect the plants the hope of early fruit is seldom realized. When the soil gets warmer the plants grow away without check, and quickly pass plants that have been weakened by inclement weather. I am in the habit of planting later than is usually the case in the Manawatu, and generally get fruit before any one else in similar circumstances. It is advisable to change the ground for tomatoes frequently. If any disease was present on the last crop do not plant in the same soil this season. Diseases absent, they are generally expected to do well twice in the same place. Methods of training and supporting the plants are many, with one main principle running through all. The method I find best in a place subject to cutting winds charged with salt from the sea is to stretch two strong wires, the highest about 20 in. or 22 in. from the ground, the other midway between it and the ground. A strong post is put at each end to stand straining, and a stiff stake is placed about every 18 yards. A piece of supplejack is provided for every plant. These are 30 in. apart. Each plant is reduced to two branches, one along each wire, and they are stopped when they reach the next plant. When planting, put the plants in deep—2 in. or 3 in., or even more with tall plants. If the stems should be buried new roots are pushed out from the buried part of these. The plants should not be watered when put out: it often rots the roots. They do not require it in any case. They will flag under the sun for a day or two, but soon get a hold of the soil. Regarding manure, my experience, gained by watching various growers through many years, has been that disease is most frequent where stable manure is used, yet I consider this necessary on dry, light soil. With good land I find a little superphosphate and bonedust answers very well. A handful is sufficient for three or four plants. I spread it broadcast and hoe it in.

All the *gourd* family—marrows, pumpkins, melons, and cucumbers—may be sown in the open ground. The first week in November is the time for the Wellington Province. Plant when danger from frost is past is a safe rule, as by then the soil is in most places warm enough to germinate the seed. It is quite a mistake to suppose that this family requires a lot of dung to grow them. They will do well on a heap of manure, because of the moisture, but they will not root into the manure except in a very minor way, and even then not until sun

and rain has robbed it of its strength. What they do require is moisture, for which reason they do well on a heap of weeds or garden rubbish, not that they root into that either, except just on the surface, but it keeps the roots cool while they work in soil which has been thrown on the top. They do equally well on good land in which there is a fair amount of humus, with no manure of any kind added.

*French* and *runner beans* may be sown in any part now. If they have been already sown, a month thereafter will be soon enough for the next French beans. Runners are usually only sown once in the season, and after many trials I find no advantage in a second sowing, always provided that the crop is kept closely gathered to prevent beans maturing.

Winter roots of *red beet* are provided by sowing long-rooted kinds during the first week in November. If, as was advised, a sowing of turnip-rooted beet was made earlier and there appears to be plenty to supply requirements, it will not be wise to rely on them for winter use, for my experience has been that in normal summers they become tough and overgrown; the past summer having been cold they remained in usable condition right through.

Sow *carrot* and *parsnip* for the main supply during the four weeks from mid-October to the same time in November. Early in November sow White Queen onion for pickling. Select a sunny spot, rather poor soil, tread it firmly, sow thickly, and do not thin the plants.

## Small Fruit.

*Gooseberries.*—It is quite common to see these bushes so densely furnished with branches that fruit cannot be gathered without great inconvenience. When the bushes are in such a state it is always safe to assume that they are not as profitable as they might be, for though there may be—doubtless will be in fact—plenty of fruit, it cannot be of the best quality. A smaller number of increased size would be better. The best crops are obtained from bushes not overcrowded with branches, but disposed thinly enough to admit light and air. Faults of this kind are easier seen when the bushes are in growth than during winter, and after the present crop has been gathered is a good time to remedy the mistake. If the surplus branches are then cut out it will throw additional strength into those left, and the benefit of increased light and air will effect wonders. It should be noted if there is any appearance of the leaf-spot disease. If so, spray as soon as the fruit is off with Bordeaux mixture of 4-4-40 strength. When thinning out branches endeavour to lift the bush upward by cutting out lower branches, and open up the centre as well as can be done. This is not always easy in practice with some varieties, but it

is always possible to so dispose the branches as to admit light to all parts. Where there has been much cutting back or out in winter there is pretty sure to be plenty of gross shoots springing now. Maybe some of these are wanted to fill gaps. All that are not wanted should be got rid of at once. They are easily pushed out of their sockets and are so got rid of completely, whereas if they are left they crowd the bushes, and are much harder to get out when the wood at point of issue has become hardened.

*Red* and *white currants.*—If these have been treated as advised, and trained to as near as possible a cup-shaped form, consisting of main branches only, and these with all the side shoots closely spur-pruned, the after-treatment will be simple. Any gross shoots appearing in the heart of the bush should be pulled out, not cut back. Shoots appearing on the spurs should be stopped at 6 in. It will not matter much if they go twice that length before they are stopped. If they do, cut them back to about 6 in., but do not cut much lower. This is an important point, having for its object the development of spurs at the base of the shoots. It is necessary to leave outlets for further summer growth, the shoots being left 6 in. long. The two or three top buds develop further shoots, but these are not very strong. Next winter the first shoot will be again shortened, this time to a spur. If it were cut lower now the bottom buds would break into growth instead of forming fruit-buds.

*Black currants* are to be allowed to retain the strong shoots they may make, provided these are not too numerous, in which case pull some out. The bush should not be crowded.

*Cape gooseberry* plants may now be put out. If they are strong plants they should begin to ripen fruit during March. When planting in the open I prefer to put three plants in a small triangle—a 6 in. base. They then lock together and support each other against winds. The clumps may be 5 ft. apart. No other treatment is required. Growth should be natural.

*Raspberries.*—Surplus suckers should be kept in subjection. Where the plantation is not large those that come up between the rows should be forked out. This is the only way to get quit of them altogether, but this may not be always possible, in which case chop them off. In a garden plot it is a good plan to give a mulch of strawy manure. This serves to conserve moisture, and saves the ground from the ill effects of much trampling.

## Flower-culture.

*Chrysanthemums* should be planted in their growing-quarters about the last week in October. There is, of course, no harm in planting

earlier, but as very little growth is made before that time it is best to keep the ground free, so that it may be worked and kept sweet. This applies more particularly when they are to be grown in a place by themselves, and is decidedly best if good flowers are wanted, or if they are wanted for cutting in quantity. In such a case the best thing is to plant a sufficient number of selected varieties about the garden for floral effect, and grow a patch elsewhere for supplying flowers for cutting. My own plan was a patch in the vegetable garden. This gave opportunity to change the position every year. Very few people wish to grow the giant flowers seen at exhibitions. These are grown at considerable sacrifice, for only from two to six are usually allowed on a plant. Their production is also a matter involving a long study of the different varieties, so as to gain the necessary knowledge to guide one in the operation known as taking the buds, a quite complex study. For ordinary use in house-decoration, flowers in clusters are better than large separate flowers, but these require to have some good-sized flowers on them—that is, according to the nature of the variety—for if a variety is capable of bearing large flowers these are seldom very beautiful if small. The cluster in that case should have the uppermost flowers of a fair size. Good soil and a fair amount of manure are requisite to grow chrysanthemums. If it is convenient give a dressing of soot, enough to cover the ground, a week or so before planting; fork it in after a day or two—this will clear the soil of slugs, wireworm, &c. The plants, which need be only one single piece, may be put out in rows 3 ft. apart with half that distance between the plants. The plants need not necessarily be pinched to make them short. There is what is known as a natural break about midsummer, and that provides enough branches. Nevertheless for the purpose of keeping tall growers down a bit they may be stopped if desired as soon as they begin to grow after planting. Beyond this nothing is required except to keep the plants secure by tying to shakes until the flower-buds show.

*Roses* are usually troubled more or less by aphis on the flower-buds and stems. There are many inquirers as to treatment, and many experiment on their own account, using all sorts of things, from washing-water to Bordeaux mixture. I have never yet sprayed a rose for aphis, having got rid of them either by means of a soft plate-brush, or with my fingers, and the caterpillars that infest the leaves are also easily got rid of by using the fingers. This plan is recommended by some of the greatest authorities on rose-culture. Mildew on the leaves, however, is a different matter, and if the attack is at all bad, spraying should be done. Some recommend dusting with flowers of sulphur, but it is not a very thorough remedy. The best way to use the sulphur is as a spray. Mix a handful of sulphur into a stiff paste with a little

milk—any kind of milk, fresh, sour, or skimmed. Fill a fair-sized bucket with tepid water, add the sulphur, and stir well. This may be syringed all over the plant; it is a sure cure. The remedy most frequently advised by authorities is sulphide of potassium. To 5 gallons water add 1 oz. of the potassium-sulphide and the white of two eggs. Spray with a fine nozzle. Spraying should be done in the evening, after the sun is off the plants. Avoid Bordeaux mixture; it burns the foliage.

*Planting* and *sowing*.—Seedlings raised in boxes should be ready for planting out, and before the next issue of this *Journal* is out pretty well all planting and sowing for this season's display should be done. November sees the beginning of hot weather, and as soon as that month is in anything suitable for outside cultivation may be sown in the open ground. This refers to such things as asters, ten-week-stocks, zinnias, salpiglossis, nemesias, marigolds—French and African—celosias, &c.

*Anemones* are among the best of all flowers, either for garden display or for house-decoration, for they flower throughout the whole winter and spring. The best way to get them is by seed. It may be advisable to purchase a few tubers to work up a stock, but the display should be obtained from home-grown plants. It will take several years to get a good stock unless there is a liberal outlay to commence with. Seed sown during October in the place where they are to flower will produce flowers quicker and earlier than can be obtained by any other means. The seed should be sown in very shallow drills. Being very fluffy, the seed should be mixed with a little dry sand, which makes it easier to sow. When once a start is made with a few plants these will by seeding provide a large stock very quickly, and the variations of colouring as a result from crossing by bees and butterflies are sure to be endless. A packet each of the single and double St. Bridgid strain will make a good start.

*Violets* should be planted as soon as possible. It is better to plant now than in autumn, because they become established before flowering-time comes. Young runners from the outside of the rows should be selected for planting in preference to the older ones in the centre, although the latter may appear the stronger. The largest-flowered violets are La France, Princess of Wales, Cailfornia, and several others, but the old Czar still appears to be the best as regards perfume. John Raddenbury is well worth growing; very distinct and free flowering, with a light-blue colour. Admiral Avellan is well worth having, but more as a curiosity than for any intrinsic value. Its place is on a rockery or shady bank. The flowers are red. I believe from what I have seen that the old Neapolitan is the best of the doubles.

# ORCHARD WORK FOR NOVEMBER.

W. A. Boucher.

## Cultivation.

In order to produce fruit of full size and high quality it is necessary that thorough cultivation should be maintained throughout the season. Much of the land planted in orchard consists of more of less stiff clay, a class of soil that requires careful working. If left to become too dry it breaks up in clots that are hard to work down into a suitable mulch, while much the same thing happens if worked when too wet. Frequently in many localities warm dry weather sets in in November or December, so that no time should be lost in bringing the soil of orchard or garden into the best possible condition for the summer season.

## Spraying.

### *Mussel Scale.*

In any instances where spraying for mussel scale has not been satisfactorily accomplished a further opportunity of controlling the pest will occur when the young scale are on the move. A careful watch for this period should be kept, and the trees sprayed with the kerosene emulsion while the insects are still sufficiently tender to be easily killed.

### *Codlin-moth, Leaf-roller, Caterpillar, and Bronze Beetle.*

These pests will now require the attention of fruitgrowers. As soon as the different varieties of apples, pears, and quinces have set their crops of fruit the trees should be carefully and thoroughly sprayed with arsenate of lead. There are several brands of this material which have been proved to be satisfactory now on the market. When spraying for codlin-moth it is not sufficient to spray round the trees only, for in that case many fruits receiving a coating of the poison on one part only will still be liable to attack on the unsprayed portion. Care should be taken that the spray nozzle should be directed not only round but through the trees from side to side. If a reliable brand of arsenate of lead is used and care exercised in application there should be less than 1 per cent. of infected fruit. There have been instances where as the result of thoroughly careful work crops of fruit have been gathered without a single infected specimen being detected.

In most localities apple and pear scab are more or less troublesome. To control these fungus diseases it will be necessary to use the Bordeaux mixture, 4-5-50 formula, for the first one or two sprayings, to which arsenate of lead will be added, forming a combined spray for insect pests and fungus diseases.

*Leech.*

Attack by this pest should not be overlooked even in the case of young non-bearing trees. Injury to foliage always reacts more or less seriously upon the health of the tree. In the case of pears and quinces sprayed with arsenate of lead for the control of codlin-moth further treatment for leech will not be necessary. To control the pest on cherry-trees arsenate of lead should be applied in the same proportion as for codlin-moth.

Some fruits, especially some varieties of plums, are susceptible to injury to foliage if sprayed with arsenate of lead. In such instances 1 oz. white hellebore powder to 2 gallons of water should be substituted. In order to secure the best results the powder should be mixed with boiling water twenty-four hours, or preferably longer, before it is required for use.

*Peach-aphis.*

This pest has proved very troublesome in some localities. When its appearance is first noticed affected trees should be sprayed with tobacco-wash made as follows: Boil in a closed vessel 1 lb. of strong tobacco (or 3 lb. tobacco-waste) with 3 lb. soft-soap in 2 gallons of water; then add 18 gallons of water.

As some difficulty occurs in destroying the fully developed aphis, a second application of the mixture should be made four or five days after the first spraying, in order to destroy the young generation produced by the fully developed aphis which escaped destruction at the first spraying.

*Cherry Leaf-scorch.*

The attack of this fungus can be detected quite early in the season, and no time should be lost in checking it. As this disease is now to be found in most localities where cherry-trees have been planted, it would be a wise precaution on the part of growers to spray the trees, as soon as the season's growth of foliage has fairly hardened, with the Bordeaux mixture, 4-5-50 formula.

*Gooseberry Leaf-spot.*

This fungus has become very widely distributed. Fortunately, it is easily kept under control by spraying with the winter formula of the Bordeaux mixture when the plants are quite dormant, followed by

a second spraying with 4-5-50 formula applied as soon as possible after the crop has been gathered.

*Black-spot of the Grape.*

Vineyards planted in districts where humid atmospheric conditions are experienced in the early part of the season are liable to severe attack by the fungus, followed by serious injury and loss if the necessary preventive measures have not been adopted. Spraying with the winter formula of the Bordeaux mixture when the buds commence to swell should be followed by applications of the 4-5-50 Bordeaux after the vines have well started into growth. When warm dry weather has set in but little further trouble with this disease may be expected. It is to be noted that hardy varieties of vines such as Albany Surprise and Isabella are less subject to injury by black-spot than the more delicate varieties of European origin.

Thinning Fruit.

There are many varieties of the different classes of fruits which have a tendency to overbear. With such varieties growers will find that time spent in judicious thining is time well occupied. By reducing the excessive amount of fruit the vitality of the tree will be conserved and in many instances a good average annual yield maintained, instead of a heavy crop of small inferior fruit one season, succeeded by a sparse crop the following season. A further advantage is that the selling-value of the crop is increased, especially in the case of peaches, for well-developed fruit of good colour and quality should always realize a much higher value than fruit small and inferior in quality.

## SEAWEED AND BLIGHT-PREVENTION.

In a paragraph in the *Dominion* of the 9th ultimo, headed "A Blight-preventive," it was stated that Mr. Francis Auchinleck, of Wairere, near Cheviot, had, by using seaweed as a fertilizer round the stems of his fruit-trees, prevented "blight" of any kind attacking plums, apricots, pears, apples, nectarines, or peaches. It was also stated that Mr. Courtier, Government Orchard Instructor, had frequently inspected the property, but could find no trace of blight of any kind. Mr. Courtier was asked for a report on the matter. From this it would appear that the writer of the newspaper article in question has evidently made some mistake. Mr. Courtier states that he has inspected the orchard on two occasions, and found trees infected with red spider, mussel scale, and shot-hole fungus, while some of the potatoes were suffering from Irish blight. It also appears that other orchards in the immediate neighbourhood where seaweed has not been used are almost, if not quite, as free of woolly aphis.—*T. W. Kirk.*

# VINEYARD-WORK FOR THE MONTH.

S. F. Anderson.

In Hawke's Bay outdoor vines are now making a strong start, and will shortly be ready for their first sulphuring. The mildew (*Oidium*) attacks all classes of vines except the American in this district. The tender leaves are the first and most seriously attacked. It must be remembered that it should be used as a preventive, and before the shoots are 4 in. long. Closely following the above is breaking out or pinching off the suckers that come out round the stem. These are most abundant on the strong-growing kinds. In the case of the Muscat Hamburgh it may be desirable to encourage some of the suckers to grow, to obtain new rods. In that case the old rod must be retained another year, as spurs from suckers do not as a rule produce fruit the first year.

In northern Hawke's Bay black-spot is the chief trouble with the vine-grower, the remedy for this being the summer formula of the Bordeaux mixture. The first spraying should be done when the leaves have just unfolded, and another a fortnight later. Further sprayings will be needful, but it is the early ones that are the most effective preventive of this disease. Vines should always be grown on rising ground. It is almost impossible to control black-spot on low-lying land even when it is well drained. The remarks made on breaking out suckers apply also in the North.

With regard to the American class of vine, such as the Isabella, Niagara, Albany, Surprise, and others, these require to have all suckers removed from their stems in the same manner.

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It is estimated that last year Australia imported artifical manures to the value of over a million pounds sterling—a development of but fifteen years.

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Speaking at our Victorian Fruitgrowers' Conference last month, Mr. McAlpine, the Federal Vegetable Pathologist, who is investigating the bitter-pit problem, spoke of the lessons arising from this important work as far as it has progressed. He stated that tests with apples in cool-storage furnished evidence that by keeping the fruit at a temperature of from 30° to 32° Fahr. the development of bitter-pit is prevented. Mr. McAlpine assured the conference of his firm conviction that bitter-pit is an internal disease, due solely to internal causes.

# THE POULTRY INDUSTRY.

F. C. Brown.

October and November are two of the busiest months of the year. The heaviest stock of the year is now being carried, and with this the work of management is being rendered difficult in many ways, thereby demanding the greatest care and diligence to ensure good results from both the mature and developing stock. In the first place, the breeding-birds are naturally not so vigorous at the tail end of the season, with the result that the last of the chickens hatched are not so robust as those from eggs laid when the breeders were in their best condition. Added to this the warm weather is now on, and, handicapped by weakened parents and exhausting weather, the late-hatched stock demand every care that can be bestowed upon them if they are to make payable layers. Ample shade is imperative in addition to the young birds receiving the best of food and attention. Again, the quarters naturally become less pure as the season advances —always a drawback to the later chicks. With the advent of warmer weather vermin will commence to give trouble, and unless every precaution is taken — cleansing operations must be vigorously pursued even at this busy time — the developing stock will seriously suffer. Cleanliness is one of the secrets of success in poultry-keeping, but at the present time it is the most important item in the work of management. Overcrowding must be sedulously guarded against. Of course, the plant will be now taxed to its utmost; but it is only inviting trouble to make the buildings carry more than they are built to accommodate. To secure really payable stock the birds must never receive a set-back, and one of the most common checks to development is overcrowding.

Too many people depend on weather-conditions, arguing that as the days are becoming warmer they can afford to reduce the heat in the brooder and take less care with the young stock generally. No risk can be taken. A cold snap is just as probable now as it was in the early spring. The safest course is to provide against the most adverse conditions.

A distinct weakling should never be bothered with. Better far to kill it off at once, and thereby save the worry of endeavouring to rear a bird which, if it comes to maturity, may never prove really profitable. Again, it is the weakling which is apt to catch a

disease, and thus may be the means of introducing a trouble to a plant which may prove disastrous in its consequences.

Separate the sexes as soon as possible. This will be to the advantage of both cockerels and pullets. If the cockerels are to be reared and marketed they should never be neglected or stinted in their feed. Remember it is the frame that is the costly part of the bird, and that the flesh put on it by good feeding is the only part of the animal which can be looked to for profit. It is poor economy to keep cockerels on a merely living diet and market them as stores, while it is decidedly profitable to put flesh on them as rapidly as possible and market them when from four to four and a half months' old, when they have their chicken flesh on them and are worth big money to the city poulterer. I have just been interviewed by a man who wants five hundred prime cockerels not older than four and a half months, and he was prepared to give more for these than for older cockerels at a heavier weight. He required them for a city club, and intended killing at once and putting them into a freezing-chamber, to be taken out as required. In addition to securing a high price for prime birds at a tender age, there is the great advantage of having them out of the way, and thereby having more space for the young pullets, to say nothing of the saving in labour and attendance.

A great weakness on some plants is to neglect male birds intended for another season's use after they have been taken out of the breeding-pens. To maintain a bird in vigorous condition it is necessary that it should be kept in a healthy thriving state right throughout its life. No after liberal treatment will make up for months of neglect. Too often a good rooster is kept during a hot summer in a confined coop without any of the requirements of good health, such as dust-bath, fresh water, green food, grit, shelter, &c. If a cock bird is not to be used again get rid of him as quickly as possible, but if he is good enough to keep he should be good enough to be well cared for.

Green food is especially necessary in hot weather, and it cannot be oversupplied. The young stock demand it particularly, while it is the best assurance of a healthy flock. It is easily the best of all drugs—in fact, the only corrective a fowl requires. A good supply of green stuff materially assists in reducing the grain bill, and thereby makes for economical production.

## Export of Eggs.

With the object of testing outside markets, in order to relieve local markets when these are oversupplied, and to discover the best means of shipping eggs abroad, the Department has made a trial shipment of eggs to the Vancouver market. The shipment comprised eight cases of fresh eggs of thirty dozen each. Two cases consisted of

eggs packed in cardboard fillers, two cases of eggs sterilized by the cabinet system, two cases of chilled eggs (one case having been in cool-store at a temperature of 33° Fahr. for a month, and the other having been held at a like temperature for ten days), one case of eggs packed in husks, and one case of sterilized eggs packed in husks. The shipment has been consigned to reliable agents in Vancouver, and will be disposed of under supervision of the New Zealand Trade Commissioner in British Columbia, who has been asked to report fully on the experiment.

The eggs are to be carried at temperatures between 33° to 34° Fahr., and a daily record is to be kept by an officer of the Union Steamship Company of the temperature of the chamber. This record will be handed to the Department's representative on the arrival of the eggs at Vancouver.

## Vermin.

Where cats, stoats, and weasels are troublesome it is sometimes necessary to take precautions against these vermin climbing wire-netted fences. A good idea adopted by the overseer of the Milton poultry plant, Mr. A. Carr, is to place a sloping ledge of plain galvanized iron along the top of all the outside fences, the iron being so shaped that the animals cannot climb over it. The iron is fastened by roofing-nails to a batten, which stretches from post to post, there being projecting supports for the iron at the posts. The style of the protection may be studied from the accompanying illustration.


Section of Iron Ledge, showing Support provided to attach Ledge to Posts.

Stoats and weasels may be simply trapped by placing next to the wall of the house, or against the run, two ordinary drainpipes end to end, but sufficiently apart for a rabbit-trap to be worked between the two. These animals delight to run in and out of the pipes, which thereby attract them to the spot. The trap should be an old one, and must be set very lightly, so that it will work at the lightest pressure.

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The profits from a pen of fowls largely depend on the man in charge of them.

# ARTIFICIAL INCUBATION.

C. Cussen.

This article is not written with the intention of laying down any hard-and-fast rule to be followed under all climatic conditions, or specifying any one machine to be worked in order to get the best results but more to give the method and the class of machine that has proved most successful after several years' experience with different styles of incubators at the Ruakura Farm of Instruction.

There is little doubt that an incubator is not yet built which is *the best* worked under the same conditions in all climates: but the machines that have given best results at this station are those with ventilation above and below the eggs and a moisture-tray below, so arranged that all ventilation entering the egg-chamber must pass through moistened scrim or cloth before coming in contact with the eggs. The non-moisture machines have not been so successful, the chickens hatched, as a rule, not being so strong and being more difficult to rear than those hatched from eggs supplied with moisture during incubation. It matters little how a machine is heated, whether by hot air or a hot-water tank, so long as the desired heat can be maintained, and with a little care this difficulty can be overcome with practically all well-built incubators.

The greatest problem in artificial incubation is how and when to apply ventilation and moisture to the eggs. It is not intended to separate these two factors, for I consider they should go together, but I will take ventilation first, as this is even more necessary in the incubator house or room; for if kerosene-fumes, &c., are allowed to remain therein, it cannot be expected that the hatch will produce strong healthy chicks. These remarks apply more especially to those working the non-moisture class of incubator. It may be mentioned that the incubator-house at this farm is a concrete building with a tiled roof, and the room-temperature keeps fairly even. Above each incubator-lamp is a tin cone which collects the fumes from the lamps and carries them off in a pipe through the roof. The windows are always kept open, as is also the door, except at night or when the wind is likely to affect the lamps.

The best results have been obtained when ventilation and moisture were supplied from the start, and, as before mentioned, when so arranged that all air before coming in contact with the eggs passed through damp scrim or cloth, with ventilation above, so that the eggs could throw off the moisture not required. As to the ventilation necessary for a given number of eggs in order to get the best results, better hatches have been obtained when more ventilation was supplied during the last ten days than when supplied in the early stages.

Too much ventilation seems to cause a rupture of the blood system in the eggs during the early stages of incubation, and if too little is

supplied the chicks do not hatch as strong, and are more difficult to rear. I do not like dry air to enter the air-chamber. If the temperature has been correct and the eggs not chilled when cooling, and it is found that a number of strong germs die between the first test and hatching-time, we must look to moisture and ventilation in most cases to find the cause.

The eggs are turned once a day after the second day and twice each day after the first week. When turning it is advisable to move the eggs to different parts of the drawer; this will help to even up the heat, as no machine is even in heat in every part of the egg-chamber. As to cooling, this all depends on the weather and if the heat of the eggs can be again quickly raised to the required temperature. If it takes more than an hour and a half to get the heat up again it is better to allow a shorter period for cooling. A hen may leave her nest for a longer period than the time allowed for cooling the eggs when hatching artificially, but it must be remembered that they are more rapidly brought back to the proper heat after she returns.

When working the incubator a record should be kept as to how the machine is run, when the eggs are cooled and turned, when and how moisture and ventilation are supplied. A note should be also taken of the weather-conditions. This does not take up much time and will be found very useful for future hatching. This may also serve to convince others of the correctness of my own conclusions that the weather has something to do with the varied results obtained from the same machine, and that the results obtained are not all due to the condition of the stock; at the same time it must not be inferred that I do not attach great importance to the stock being in good breeding-condition.

INCUBATOR-ROOM AT RUAKURA FARM OF INSTRUCTION.

Showing the pipe method of carrying away the fumes from the lamps of the machines.

As regards temperature, from 103° to 104°, with the thermometers resting on the eggs, has given the best results. It is almost impossible to keep a machine just at the one heat right through the hatch, but the nearer it can be done the better. Care should be taken to see that all thermometers have been properly tested, and when replacing them in the machine, after having cooled and turned the eggs, see that they are placed in as near the same position each time, and not between the eggs one time and on top the next; also that the eggs nearest the bulb of the thermometer contain a good strong germ, for an egg containing a dead germ will often register several degrees lower than others containing good strong ones.

When selecting eggs for hatching, uniformity in size, colour, and shape should be the primary objects. Rough- or thin-shelled eggs should not be set, and dirty eggs should be washed. Stale eggs are deficient in moisture according to their age, and do not hatch well.

The following chart will show how the last machine to hatch at Ruakura was worked:—

Set 19th July; due 9th August.

| Date. | Temperature. | | | How treated. | |
|---|---|---|---|---|---|
| | Morning. | Noon. | Night. | Morning. | Night. |
| July | Deg. | Deg. | Deg. | | |
| 19 | .. | .. | 102 | Not moved .. .. | Not moved. |
| 20 | 102 | 103 | 104 | ,, .. .. | ,, |
| 21 | 103 | 104 | 104 | ,, .. .. | ,, |
| 22 | 102 | 104 | 103 | Turned and aired 5 minutes | ,, |
| 23 | 103½ | 104 | 103 | ,, 5 ,, | ,, |
| 24 | 103 | 104 | 103 | ,, 7 ,, | ,, |
| 25 | 103 | 104 | 103½ | ,, 7 ,, | Turned. |
| 26 | 103 | 106 | 104* | ,, 15 ,, | ,, |
| 27 | 103½ | 103 | 104 | ,, 10 ,, | Turned and aired 5 minutes. |
| 28 | 101 | 102 | 104 | ,, 10 ,, | ,, 7 ,, |
| 29 | 104 | 104 | 104 | ,, 12 ,, | ,, 7 ,, |
| 30 | 102 | 99 | 103 | ,, 12 ,, | ,, 7 ,, |
| 31 | 99 | 102 | 104 | ,, 15 ,, | ,, 9 ,, |
| Aug. | | | | | |
| 1 | 101 | 102½ | 104 | ,, 15 ,, | ,, 9 ,, |
| 2 | 103½ | 102 | 104 | ,, 15 ,, | ,, 10 ,, |
| 3 | 102 | 103 | 104 | ,, 15 ,, | ,, 10 ,, |
| 4 | 102 | 99 | 104 | ,, 17 ,, | ,, 10 ,, |
| 5 | 104 | 106 | 103 | ,, 17 ,, | ,, 15 ,, |
| 6 | 104 | 103 | 104 | ,, 17 ,, | ,, 15 ,, |
| 7 | 99 | 102 | 103 | ,, 20 ,, | ,, 15 ,, |
| 8 | 109 | 103 | 104 | ,, 20 ,, | Not moved. |
| 9 | 105 | .. | .. | .. | .. |

* Tested.

Result: 88 eggs set, 9 infertile, 5 taken out at second test, 5 died in shell, 69 hatched.

Note.—The moisture-tray was kept three-parts filled with water, and a double thickness of scrim was used in the tray for the first ten days, and one thickness from the tenth day to the finish.

The machine used in this case was a "Tamlin."

# CO-OPERATIVE EXPERIMENT RECORD.

## THE PAST SEASON'S EXPERIMENTS.

### SOUTH ISLAND.

A. Macpherson.

### WHEAT.

Timaru District.

*Manurial Test, conducted by Robert Hammond, Te Moana.*

The land selected was a clayey loam on a sandy clay subsoil, and the soil of the plots was as nearly uniform in character as possible. In English grass for five years prior to 15th January, 1911, when skim-ploughed; disc-ploughed 3rd March; disc-harrowed 15th April; tine-harrowed 17th April; ploughed deep 10th May; tine-harrowed 12th May, 1911. The seed was drilled in and tine-harrowed in tenth-of-acre plots on 12th May, 1911. The variety of seed sown was Velvet Chaff, at the rate of 2 bushels per acre. The land was in good order, and the sowing was carried out under favourable conditions. The crop was harvested on 17th February, 1912. Results:—

| Plot. | Manures per Acre. | Cost of Manure per Acre. | Yield per Acre. | Effect of Manuring. | Per Square Yard. | |
|---|---|---|---|---|---|---|
| | | | | | Plants. | Stalks. |
| | | £ s. d. | Bushels. | Bushels. | | |
| 1 | Superphosphate, ½ cwt.; seed gypsum, 1 cwt. | 0 4 7½ | 56·0 | Gain, 9·17 | 62 | 306 |
| 2 | Superphosphate, 1 cwt.; seed gypsum, ½ cwt. | 0 5 10½ | 52·16 | ,, 5·33 | 69 | 470 |
| 3 | Superphosphate, 1½ cwt. .. | 0 7 1½ | 62·5 | ,, 15·67 | 60 | 408 |
| 4 | No manure .. .. | .. .. | 46·83 | .. | 67 | 375 |
| 5 | Superphosphate, 1 cwt.; bonedust, ½ cwt. | 0 7 9 | 52·25 | Gain, 5·42 | 70 | 439 |
| 6 | Superphosphate, 1 cwt.; sulphate of potash, ½ cwt.; seed gypsum, ½ cwt. | 0 9 2½ | 51·5 | ,, 4·67 | 63 | 340 |

Inspector Huddleston reports: Plot No. 1, good even crop; No. 2, fair crop; No. 3, very good crop; No. 4, thin, and did not get away like the other plots; No. 5, fair crop; No. 6, only fair crop.

Note.—Those desiring further information in regard to the South Island co-operative experiments, reported on in last issue of the *Journal*, should apply to Mr. A. Macpherson, supervisor of co-operative experimental work in the South Island, who furnished the reports referred to.

*Variety Test, conducted by Robert Hammond, Te Moana.*

The varieties, sown in tenth-of-acre plots, were seeded at the rate of 2 bushels per acre. Each plot was fertilized with—Superphosphate, ½ cwt. per acre; bonedust, ½ cwt. per acre; kainit, ½ cwt. per acre; costing, 5s. 0¾d. Grain was harvested 17th February, 1912. Results:—

| Plot. | Variety. | Yield per Acre. | Per Square Yard. | |
|---|---|---|---|---|
| | | | Plants. | Stalks. |
| | | Bushels. | | |
| 1 | Velvet Chaff .. .. .. | 51·5 | 76 | 357 |
| 2 | Solid Straw .. .. .. | 51·83 | 85 | 574 |
| 3 | Red Marvel .. .. .. | 53·54 | 79 | 361 |
| 4 | Marshall's Improved Tuscan .. | 39·91 | 96 | 277 |
| 5 | Red Tuscan .. .. .. | 28·25 | 76 | 285 |
| 6 | Federation .. .. .. | .. | 52 | 294 |
| 7 | Red Chaff .. .. .. | 50·91 | 78 | 322 |
| 8 | Pearl .. .. .. .. | 44·58 | 67 | 305 |

Inspector Huddleston reports: Plot No. 1, good even crop. No. 2, good strong crop. No. 3, good crop; seeding should be heavier for this variety. No. 4, only fair; Hessian fly affected yield. No. 5, only fair; Hessian fly affected yield. No. 6, did not come well, thin and sickly from the start, and was badly attacked by Hessian fly, rendering the test valueless: this wheat does not suit the district. No. 7, good fair crop. No. 8, only a fair crop.

## OATS.

### Timaru District.

*Variety Test, conducted by Robert Hammond, Te Moana.*

The soil of the plots, uniform as possible in character, is a clayey loam with a clay and sandy subsoil. It was in grass five years prior to being broken up in 1911, and summer-fallowed. Preparatory for the test it was skim-ploughed, 15th January, 1911; disc-ploughed 3rd March; disc-harrowed 15th April; tine-harrowed 17th April; ploughed 10th May; tine-harrowed 12th May; tine-harrowed 23rd August, 1911. The seed was drilled in and tine-harowed in tenth-of-acre plots on 26th August, 1911, the seeding being at the rate of 3 bushels per acre. The crop was harvested on the 17th February, 1912. Results:—

| Plot. | Variety. | Grain-yield per Acre. | Yield per Acre if chaffed. | Per Square Yard. | |
|---|---|---|---|---|---|
| | | | | Plants. | Stalks. |
| | | Bushels. | Tons. | | |
| 1 | Banner .. .. .. .. | 65·81 | 5·53 | 71 | 296 |
| 2 | Garton's .. .. .. .. | 78·5 | 6·88 | 105 | 332 |
| 3 | Algerian .. .. .. .. | 51·0 | 6·88 | 80 | 304 |
| 4 | Black Tartarian .. .. .. | 41·75 | 6·75 | 55 | 346 |
| 5 | Danish .. .. .. .. | 79·6 | 7·42 | 94 | 280 |
| 6 | Triumph .. .. .. | 80·0 | 5·03 | 78 | 271 |

Inspector Huddleston reports: No. 1 plot, good oat, but seeding apparently not heavy enough; No. 2, good; No. 3, poor crop; No. 4, long straw badly laid, poor yield of grain; No. 5, very good; No. 6, good crop. This variety apparently suits the district.

## MANGELS.

The past year's root experiments in the South Island were conducted on a much more extensive scale than hitherto. Although there was lack of sunshine, and cold and wet weather was experienced in many districts during the period of growth, yet the results have been on the whole fairly satisfactory. The weakness of the season was the inability of growers, owing to the wet spring, to get their seeding operations in hand at the desirable time, the delay in some cases being over six weeks. As was anticipated, this resulted in some instances in the crops failing to mature. It is gratifying to know that in many cases the farmers co-operating with the Department in the conduct of the experiments carried out their part of the work in a highly commendable manner, the ground for the plots being well prepared, and the seeds and manures sown with every care. After-cultivation is still a subject demanding more attention, and though the past season made such work very difficult it is to be hoped experimenters will consider the immense importance of this work in drier periods. I have to acknowledge much kindness and consideration shown to myself and the twenty-four Inspectors assisting me by the farmers interested. Following are the results of the manurial and variety tests :—

### Kaikoura District.

*Manurial and Variety Tests, conducted by J. H. Sandos, Kaikoura.*

The land selected was a good loam, and was in grass for twenty years before being broken up on 11th August, 1911, for the experiments. It was disc-harrowed three times ; tine-harrowed several times and rolled until well broken down from 8th to 11th September ; ploughed, disc and tine harrowed, and rolled on 15th September ; disc, tine-harrowed, and rolled 27th September ; and tine-harrowed and rolled 21st October, 1911.

In the manurial test the area was divided into six manurial plots and one unmanured plot of one-tenth of an acre each. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. The soil in the plots was uniform in character. The seed was drilled in on the flat in rows 21 in. apart on 23rd October, 1911.

In the variety test 1½ cwt. of superphosphate was applied along with the seed. The land was well cultivated, and the sowing was completed under favourable conditions. Results :—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 44·44 | 5·52 | Gain, 12·86 |
| 2 | Superphosphate, 2 cwt. ; island guano, 1 cwt. | 0 14 3 | 45·11 | 4·24 | „ 13·53 |
| 3 | Superphosphate, 2 cwt. ; island guano, 1 cwt. ; sulphate of potash, 1 cwt. | 1 9 3 | 48·48 | 4·57 | „ 16·90 |
| 4 | No manure .. .. .. | .. | 31·58 | 5·31 | .. |
| 5 | Superphosphate, 2 cwt. ; island guano, 1 cwt. ; sulphate of potash, 1 cwt. ; salt, 1 cwt. | 1 11 6 | 50·97 | 5·52 | Gain, 19·39 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 53·93 | 5·05 | „ 22·35 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 57·77 | 7·74 | „ 22·35 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 43·08 | 5·38 |
| 2 | ,, Monarch Yellow Globe | 41·40 | 4·37 |
| 3 | ,, Brock's Yellow Intermediate | 27·60 | 3·53 |
| 4 | Webb and Son's New Lion Yellow | 24·57 | 3·70 |
| 5 | ,, New Golden King | 28·44 | 7·91 |
| 6 | ,, Kinver Yellow Globe | 39·21 | 6·22 |
| 7 | ,, Monarch Yellow Globe | 36·35 | 4·62 |
| 8 | ,, Long Red Mammoth | 51·83 | 15·90 |
| 9 | Sutton's Yellow Globe | 49·81 | 4·79 |
| 10 | ,, Devon Yellow Globe | 41·06 | 4·54 |
| 11 | ,, Golden Tankard | 37·19 | 7·06 |
| 12 | ,, Mammoth Long Red | 54·27 | 10·43 |
| 13 | ,, Crimson Tankard | 30·96 | 5·38 |
| 14 | ,, Sugar Mangold | 40·72 | 8·24 |
| 15 | ,, Prize-winner | 33·82 | 4·54 |
| 16 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 53·68 | 5·46 |
| 17 | ,, New-Zealand-grown Long Red | 47·96 | 8·91 |
| 18 | ,, New-Zealand-grown Golden Tankard | 32·48 | 5·89 |
| 19 | ,, Elvethian Long Red | 40·39 | 11·00 |
| 20 | ,, Half-sugar Giant Red | 37·53 | 7·74 |
| 21 | ,, Half-sugar Giant Rose | 34·49 | 6·98 |
| 22 | ,, Half-sugar Giant White | 34·66 | 5·63 |
| 23 | ,, Corner's Yellow Globe | 31·80 | 3·61 |

Inspector Goodall reports: In all experiments the varieties sown struck well, a slight difference being noticeable in some compared with others. The young plants were not injured by grub, and all manurial and variety plots were free from disease.

RANGIORA DISTRICT.

*Variety Test, conducted at Rangiora High School by the Agricultural Class, in charge of Mr. S. A. Clark, B.A., Assistant Master.*

The tests were carried out on the school experimental area, the soil being a rich loam. Prior to the experiment the land had been for a number of years in grass. Was ploughed up in May, 1911, and dug over in the following September. The soil in the area selected was uniform in character. The seeds were sown on the flat in rows 28 in. apart. The date of sowing was rather late. No manure was applied. The crop was harvested on 13th June, 1912. Results:—

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 12·42 | 2·35 |
| 2 | ,, Monarch Yellow Globe | 14·51 | 3·01 |
| 3 | ,, Brock's Yellow Intermediate | 24·87 | 4·72 |
| 4 | Webb and Son's New Golden King | 18·74 | 4·81 |
| 5 | ,, Kinver Yellow Globe | 27·69 | 5·03 |
| 6 | ,, Monarch Yellow Globe | 18·36 | 4·73 |
| 7 | Sutton's Devon Yellow Globe | 27·38 | 4·12 |
| 8 | ,, Crimson Tankard | 22·35 | 4·97 |
| 9 | Montgomery and Co.'s New-Zealand-grown Long Red | 24·55 | 3·68 |
| 10 | ,, Elvethian Long Red | 25·00 | 5·12 |
| 11 | ,, Half-sugar Giant Red | 19·16 | 4·87 |
| 12 | ,, Half-sugar Giant Rose | 20·03 | 4·15 |
| 13 | ,, Half-sugar Giant White | 26·54 | 3·76 |
| 14 | ,, Corner's Yellow Globe | 30·42 | 4·45 |
| 15 | ,, New-Zealand-grown Golden Tankard | 13·01 | 3·46 |

*Variety Test, conducted by the Canterbury Frozen Meat Company (Limited), Belfast.*

The land selected for the experiment was a clayey loam on a clay subsoil, and was in grass for three years prior to 1910, when it was ploughed up and a potato crop taken. For the experiments it was ploughed on 1st August, 1911; rolled 2nd August; disc and tine harrowed 5th August; ploughed 17th August; tine-harrowed 22nd and 30th August; rolled 2nd September; ploughed 15th September, and tine-harrowed 19th September, 1911. Twenty-seven varieties were sown, and were drilled in on the flat in rows 30 in. apart on 5th October, 1911, the seeding being at the rate of 6 lb. per acre. 3 cwt. of Belfast mangel-manure was applied at time of sowing the seed. The land received thorough cultivation during the early growth of the crop. The roots were pulled and weighed on 14th May, 1912. Results:—

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 73·53 | 9·42 |
| 2 | " Monarch Yellow Globe | 91·92 | 13·20 |
| 3 | " Golden Globe | 61·33 | 15·13 |
| 4 | " Champion Orange Globe | 64·81 | 13·20 |
| 5 | " Brock's Yellow Intermediate | 56·56 | 7·77 |
| 6 | " Select Golden Tankard | 61·04 | 9·89 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 64·58 | 8·49 |
| 8 | " New Golden King | 43·84 | 7·83 |
| 9 | " Kinver Yellow Globe | 50·26 | 7·07 |
| 10 | " Monarch Yellow Globe | 50·91 | 3·53 |
| 11 | " Long Red Mammoth | 51·14 | 11·78 |
| 12 | " New Smithfield Yellow Globe | 36·77 | 7·07 |
| 13 | Sutton's Yellow Globe | 57·75 | 7·30 |
| 14 | " Devon Yellow Globe | 70·94 | 8·72 |
| 15 | " Golden Tankard | 59·63 | 11·07 |
| 16 | " Mammoth Long Red | 65·52 | 13·20 |
| 17 | " Crimson Tankard | 64·58 | 10·84 |
| 18 | " Sugar Mangold | 62·75 | 12·72 |
| 19 | " Prize-winner | 79·20 | 10·37 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 80·60 | 8·95 |
| 21 | " New-Zealand-grown Long Red | 51·38 | 12·25 |
| 22 | " New-Zealand-grown Golden Tankard | 61·33 | 13·67 |
| 23 | " Elvethian Long Red | 57·51 | 15·13 |
| 24 | " Half-sugar Giant Red | 59·63 | 16·49 |
| 25 | " Half-sugar Giant White | 66·33 | 14·37 |
| 26 | " Half-sugar Giant Rose | 56·56 | 14·37 |
| 27 | " Corner's Yellow Globe | 61·33 | 7·77 |

Early in January the leaves of the twenty-seven varieties were badly attacked by a leaf-miner, which was described in the Department's *Journal*, No. 4, Vol. 4, 15th April, 1912. The attack of the pest, however, did not last long, the crop quickly recovering. The crop was otherwise healthy.

### Lincoln District.

*Manurial Test, conducted by G. Rennie, Lincoln.*

The land selected for the experiment was a clayey loam on a clay subsoil, and had been in English grass for three years prior to being put in wheat in 1910. There was a good deal of twitch growing in the area. The preparatory cultivation for present experiment was as follows: Skim-ploughed 11th January, 1911; tine-harrowed (two strokes) and Cambridge-rolled, 20th March; grubbed twice, 22nd March; grubbed 4th April; tine-harrowed 7th April; grubbed 8th April; chain harrowed and twitch burnt, 10th April; ploughed 7 in. deep 24th August; grubbed and tine-harrowed 16th September; Cambridge-rolled 20th September, 1911. The area was divided into six manurial and one unmanured plot. The fertilizers applied were according to a scheme designed by the Chief Agricultural Chemist. The seeds and fertilizers were sown on the flat in drills 28 in. wide on 20th October, 1911, and the area was lightly harrowed and

rolled on the following day. The variety sown was Sutton's Prize-winner, the seeding being at the rate of 6 lb. per acre. Intercultivation was given at short intervals during the early growth of the crop. The roots were pulled and weighed on 15th June, 1912. Results :—

| Plot. | Manures per Acre. | Cost per Acre. | Yield per Acre. | Effect of Manuring. |
|---|---|---|---|---|
| | | £ s. d. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. .. .. | 0 9 6 | 42·00 | Gain, 30·00 |
| 2 | Superphosphate, 2 cwt ; island guano, 1 cwt. | 0 14 3 | 66·50 | ,, 54·50 |
| 3 | Superphosphate, 2 cwt. ; island guano, 1 cwt ; sulphate potash, 1 cwt. | 1 9 3 | 77·00 | ,, 65·00 |
| 4 | No manure .. .. .. .. | .. | 12·00 | .. |
| 5 | Superphosphate, 2 cwt. ; island guano, 1 cwt. ; sulphate potash, 1 cwt. ; salt, ½ cwt. | 1 11 6 | 55·00 | Gain, 43·00 |
| 6 | Same as plot 5, with dried blood, 1 cwt. .. | 1 18 6 | 69·25 | ,, 57·25 |
| 7 | Lime, 40 cwt. .. .. .. .. | 2 0 0 | 21·00 | ,, 9·00 |

Inspector Scott reports : During the early part of the season Nos. 2 and 3 plots were the best in appearance ; later on No. 3 obtained a lead and kept it to the end. Plot 6 improved very fast towards the end of the season. Plot 4 did very badly all through. Its tops, however, weighed proportionately very much heavier than those of any of the others. Like No. 4, No. 7 came away very slowly, the leafage being a much darker green than that of the other plots. The roots were very healthy.

## RANGIORA DISTRICT.

*Manurial and Variety Tests, conducted by W. Davis, Amberley.*

The land selected was sandy loam on a shingly subsoil, and had been in grass for five years prior to being broken up in July, 1911, for present experiments. It was ploughed twice, disc- and tine-harrowed and rolled in August ; disc-harrowed and tine-harrowed twice and rolled in September ; ploughed twice, disc-harrowed, tine-harrowed, and rolled in October, 1911. In the manurial test the area was divided into six manurial and one unmanured plot of one-tenth acre each. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. The soil in the plots was as nearly uniform in character as possible. The seed was drilled in rows 22 in. apart on 12th October, 1911. The variety of seed sown was Sutton's Prize-winner. In the variety test 6 cwt. per acre of Belfast rape-manure was applied along with the seed. The land was well cultivated, and the sowing completed under favourable conditions. Results :—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 38·00 | 9·13 | Gain, 9·43 |
| 2 | Superphosphate, 2 cwt. ; island guano, 1 cwt. | 0 14 3 | 41·83 | 8·54 | ,, 13·26 |
| 3 | Superphosphate, 2 cwt. ; island guano, 1 cwt. ; sulphate of potash, 1 cwt. | 1 9 3 | 38·88 | 10·60 | ,, 10·31 |
| 4 | No manure .. .. .. | .. | 28·57 | 8·24 | .. |
| 5 | Superphosphate, 2 cwt. ; island guano, 1 cwt. ; sulphate of potash, 1 cwt. ; salt, 1 cwt. | 1 11 6 | 31·22 | 7·95 | Gain, 2·65 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 36·23 | 7·36 | ,, 7·66 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 30·34 | 10·31 | ,, 1·77 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 33·78 | 3·33 |
| 2 | ,, Monarch Yellow Globe | 27·88 | 4·12 |
| 3 | ,, Golden Globe | 26·12 | 5·30 |
| 4 | ,, Champion Orange | 25·92 | 4·32 |
| 5 | ,, Brock's Yellow Intermediate | 31·42 | 3·73 |
| 6 | ,, Select Golden Tankard | 30·04 | 5·49 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 28·67 | 3·14 |
| 8 | ,, New Golden King | 20·62 | 4·32 |
| 9 | ,, Kinver Yellow Globe | 20·03 | 4·51 |
| 10 | ,, Monarch Yellow Globe | 25·72 | 2·55 |
| 11 | ,, Long Red Mammoth | 25·33 | 6·08 |
| 12 | ,, New Smithfield Yellow Globe | 21·60 | 2·74 |
| 13 | Sutton's Yellow Globe | 26·90 | 2·94 |
| 14 | ,, Devon Yellow Globe | 23·96 | 2·75 |
| 15 | ,, Golden Tankard | 15·90 | 3·53 |
| 16 | ,, Mammoth Long Red | 27·69 | 6·08 |
| 17 | ,, Crimson Tankard | 28·87 | 4·71 |
| 18 | ,, Sugar Mangold | 30·83 | 3·53 |
| 19 | ,, Prize-winner | 23·37 | 5·89 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 32·99 | 6·08 |
| 21 | ,, New-Zealand-grown Long Red | 30·83 | 5·30 |
| 22 | ,, New-Zealand-grown Golden Tankard | 27·29 | 4·91 |
| 23 | ,, Elvethian Long Red | 21·40 | 5·10 |
| 24 | ,, Half-sugar Giant Red | 19·83 | 6·08 |
| 25 | ,, Half-sugar Giant Rose | 31·62 | 7·07 |
| 26 | ,, Half-sugar Giant White | 35·15 | 5·69 |
| 27 | ,, Corner's Yellow Globe | 31·81 | 3·14 |

Inspector Hughes reports: The cold and wet season and want of intercultivation was against good results.

## Lincoln District.

*Variety Test, conducted by L. Hartnell, Leeston.*

The land selected for the experiment was a clay loam on a clay subsoil, and had been in English grass for four years prior to being skim-ploughed for present experiment on 14th July, 1911. It was ploughed 7 in. deep on 18th August, 1911; ploughed and disc-harrowed four times in October; disc-harrowed twice, tine-harrowed three times, and rolled at intervals during first week in November, 1911. The seeds and fertilizers were sown in drills 28 in. wide on 8th November, 1911. 2 cwt. mangel-manure was applied per acre. Intercultivation was given when the land was sufficiently dry to work during the early growth of the crop. The roots were pulled and weighed on 19th August, 1912. Results:—

| Plot. | Variety. | Crop per Acre: Roots. |
|---|---|---|
| | | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 44·69 |
| 2 | ,, Monarch Yellow Globe | 34·85 |
| 3 | ,, Brock's Yellow Intermediate | 38·64 |
| 4 | Webb and Son's New Golden King | 34·47 |
| 5 | ,, Kinver Yellow Globe | 33·72 |
| 6 | ,, Monarch Yellow Globe | 31·07 |
| 7 | Sutton's Yellow Globe | 41·67 |
| 8 | ,, Devon Yellow Globe | 37·13 |
| 9 | ,, Golden Tankard | 34·09 |
| 10 | ,, Mammoth Long Red | 33·33 |
| 11 | ,, Crimson Tankard | 29·93 |

| Plot. | Variety. | Crop per Acre: Roots. |
|---|---|---|
| | | Tons. |
| 12 | Sutton's Sugar Mangold .. .. .. .. .. | 34·85 |
| 13 | „ Prize-winner .. .. .. .. .. | 39·39 |
| 14 | Montgomery and Co.'s New-Zealand-grown Long Red .. | 41·67 |
| 15 | „ New-Zealand-grown Long Red .. | 34·47 |
| 16 | „ New-Zealand-grown Golden Tankard .. | 25·76 |
| 17 | „ Elvethian Long Red .. .. .. | 27·28 |
| 18 | „ Half-sugar Giant Red .. .. | 31·82 |
| 19 | „ Half-sugar Giant Rose .. .. | 32·57 |
| 20 | „ Half-sugar Giant White .. .. | 28·79 |
| 21 | „ Corner's Yellow Globe .. .. | 45·46 |
| 22 | Langport's Prize-taker .. .. .. .. .. | 31·45 |

Inspector Scott, Lincoln, reports: The field in which the plots were situated was somewhat low-lying, therefore the wet and cold summer experienced was not favourable to heavy yields. Owing to the very wet state of the land in the winter the harvesting of the crop had to be left until 19th August. The long varieties suffered less from the weather-conditions than the Globes and Intermediates. Corner's Yellow Globe was the soundest of the Globes as well as the heaviest yielder of all varieties. Owing to the late date of harvesting the tops were not weighed.

### TIMARU DISTRICT.

*Manurial and Variety Tests, conducted by James King, Timaru.*

The land selected for the experiment was a clayey loam soil on a heavy clay subsoil. It was in English grass in 1907, in wheat in 1908, in barley in 1909, in oats in 1910. For the present experiment it received the following cultivation: Ploughed, disc-harrowed, and tine-harrowed twice during the last week in July, 1911; ploughed, cultivated twice, disc-harrowed twice, and rolled during September, 1911. In the manurial test the area chosen was divided into seven plots of one-tenth acre each (five manurial, one unmanured as a test plot, and one treated with lime). The manures applied were according to a formula designed by the Chief Agricultural Chemist. The seeds and fertilizers were sown in raised drills on 7th November, 1911, drills 26 in. wide. The variety of seed sown in manurial test was Sutton's Prize-winner. In the variety test the fertilizer used was superphosphate, at the rate of 1½ cwt. per acre; cost, 7s. 6d. per acre. At the time of sowing the soil was very dry. The land was in good tilth to receive the seed. The crop was harvested on 13th August, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 57·92 | 1·63 | Gain, 39·16 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 44·87 | 1·56 | „ 26·11 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 35·08 | 1·63 | „ 16·32 |
| 4 | No manure .. .. .. | .. | 18·76 | 1·56 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 24·74 | 3·26 | Gain, 5·98 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 32·90 | 4·07 | „ 14·14 |
| 7 | Lime, 40 cwt.. .. .. | 2 0 0 | 24·47 | 2·44 | „ 5·71 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 35·09 | 1·63 |
| 2 | ,, Monarch Yellow Globe | 27·74 | 2·17 |
| 3 | ,, Golden Globe | 33·46 | 2·44 |
| 4 | ,, Champion Orange Globe | 27·74 | 3·26 |
| 5 | ,, Brock's Yellow Intermediate | 43·52 | 2·44 |
| 6 | ,, Select Golden Tankard | 26·93 | 3·26 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 39·44 | 2·72 |
| 8 | ,, New Golden King | 26·93 | 3·26 |
| 9 | ,, Kinver Yellow Globe | 31·01 | 2·99 |
| 10 | ,, Monarch Yellow Globe | 30·19 | 3·26 |
| 11 | ,, Long Red Mammoth | 40·80 | 4·08 |
| 12 | ,, New Smithfield Yellow Globe | 43·25 | 3·53 |
| 13 | Sutton's Yellow Globe | 42·43 | 3·53 |
| 14 | ,, Devon Yellow Globe | 41·62 | 3·26 |
| 15 | ,, Golden Tankard | 36·72 | 4·08 |
| 16 | ,, Mammoth Long Red | 37·54 | 2·44 |
| 17 | ,, Crimson Tankard | 36·72 | 2·72 |
| 18 | ,, Sugar Mangold | 31·01 | 1·90 |
| 19 | ,, Prize-winner | 28·56 | 3·26 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 32·64 | 3·80 |
| 21 | ,, New-Zealand-grown Long Red | 31·01 | 1·90 |
| 22 | ,, New-Zealand-grown Golden Tankard | 36·72 | 4·08 |
| 23 | ,, Elvethian Long Red | Failure | ... |
| 24 | ,, Half-sugar Giant Red | 28·56 | 2·72 |
| 25 | ,, Half-sugar Giant Rose | 32·64 | 2·99 |
| 26 | ,, Half-sugar Giant White | 26·11 | 2·44 |
| 27 | ,, Corner's Yellow Globe | 40·80 | 1·63 |

Inspector Huddleston reports: The soil was very dry at time of sowing, and no rain fell for some considerable time afterwards, consequently the plants suffered in their early growth. Cold and wet weather was subsequently experienced, which was against good yields.

## Waimate District.

*Manurial and Variety Tests, conducted by W. Stewart, Waimate.*

The land selected for the experiment was a sandy loam on a clay subsoil, and had been in grass for some years prior to the 3rd March, 1911, on which date it was skim-ploughed for present experiment. It was tine-harrowed on 31st March, 1911; ploughed 5 in. deep and disc-harrowed in June; tine-harrowed (three strokes), ploughed deep and tine-harrowed during first half of October, and thrown into raised drills, 28 in. apart, on 17th October, 1911. The seeds and fertilizers were sown under favourable conditions on 17th October, 1911. The variety of seed sown in manurial tests was Sutton's Prize-winner. The fertilizers applied in variety test were 2 parts bonedust, 3 parts basic slag, and 3 parts grain-manure, sown as a mixture at the rate of 1¾ cwt. per acre. In the manurial test the area was divided into six manurial and one unmanured plot of one-tenth acre each. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. The soil in the plots was as nearly uniform in character as possible. The roots were pulled and weighed on 5th July, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre: Roots. | Effect of Manuring. |
|---|---|---|---|---|
| | | £ s. d. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. | 0 9 6 | 39·64 | Gain, 2·02 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 43·43 | „ 5·81 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 45·45 | „ 7·83 |
| 4 | No manure | | 37·62 | |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 48·23 | Gain, 10·61 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 41·41 | „ 3·79 |
| 7 | Lime, 40 cwt. | 2 0 0 | 49·49 | „ 11·87 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre: Roots. |
|---|---|---|
| | | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 41·16 |
| 2 | „ Monarch Yellow Globe | 26·51 |
| 3 | „ Golden Globe | 30·05 |
| 4 | „ Champion Orange Globe | 33·84 |
| 5 | „ Brock's Yellow Intermediate | 31·56 |
| 6 | „ Select Golden Tankard | 43·68 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 38·89 |
| 8 | „ New Golden King | 36·87 |
| 9 | „ Kinver Yellow Globe | 32·83 |
| 10 | „ Monarch Yellow Globe | 47·22 |
| 11 | „ Long Red Mammoth | 34·85 |
| 12 | „ New Smithfield Yellow Globe | 41·17 |
| 13 | Sutton's Yellow Globe | 31·82 |
| 14 | „ Devon Yellow Globe | 47·98 |
| 15 | „ Golden Tankard | 40·15 |
| 16 | „ Mammoth Long Red | 38·63 |
| 17 | „ Crimson Tankard | 38·38 |
| 18 | „ Sugar Mangold | 34·59 |
| 19 | „ Prize-winner | 37·12 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 30·30 |
| 21 | „ New-Zealand-grown Long Red | 29·29 |
| 22 | „ New-Zealand-grown Golden Tankard | 25·25 |

Inspector Macdonald reports: In the manurial test the mangels grew well, plots 7, 5, and 3 being the best from the start until harvested. In the variety test all varieties came away well. A tendency to go to seed was in evidence, possibly owing to the excessively wet season. The roots were a nice useful size and healthy throughout.

### KUROW DISTRICT.

*Manurial and Variety Test, conducted by E. O'Neill, Otekaike.*

The soil in the area selected was uniform in character, being a light free loam on a stony bottom. It was in grass for five years prior to 1910, when it was ploughed up and cropped with oats in 1911. For present experiments the stubble was ploughed on 4th July, 1911; cultivated 6 in. deep and tine-harrowed six times the first week in October, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot, and one treated with lime. Plots one-tenth acre each. The fertilizers applied were according to a design formulated by the Chief Agricultural Chemist. The variety of seed sown was Sutton's Prize-winner. The seeds and fertilizers were drilled in on 8th October, 1911; drills 24 in. apart. The tests were initiated under

favourable conditions. The roots were pulled and weighed on 15th May, 1912. Results :—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 23·84 | 7·85 | Gain, 12·88 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 13·96 | 4·38 | „ 3·00 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 14·36 | 4·58 | „ 3·40 |
| 4 | No manure .. .. .. | .. | 10·96 | 3·59 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 19·34 | 6·38 | Gain, 8·38 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 12·44 | 3·88 | „ 1·48 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 20·94 | 6·58 | „ 9·98 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 14·26 | 4·32 |
| 2 | „ Monarch Yellow Globe .. .. .. | 8·64 | 3·02 |
| 3 | Webb and Son's New Golden King .. .. .. | 8·64 | 2·59 |
| 4 | „ Kinver Yellow Globe .. .. .. | 12·96 | 4·32 |
| 5 | „ Monarch Yellow Globe .. .. .. | 6·48 | 1·72 |
| 6 | Sutton's Yellow Globe .. .. .. .. .. | 12·10 | 3·88 |
| 7 | „ Devon Yellow Globe .. .. .. .. | 6·91 | 1·72 |
| 8 | „ Crimson Tankard .. .. .. .. | 3·88 | 1·29 |
| 9 | „ Mammoth Long Red .. .. .. .. | 7·77 | 3·02 |
| 10 | „ Golden Tankard .. .. .. .. | 4·32 | 1·29 |
| 11 | „ Sugar Mangold .. .. .. .. | 8·21 | 2·80 |
| 12 | Montgomery and Co.'s New-Zealand-grown Long Red .. | 9·93 | 3·02 |
| 13 | „ Elvethian Long Red .. .. | 9·07 | 2·59 |
| 14 | „ Half-sugar Giant Red .. .. | 9·50 | 2·59 |
| 15 | „ Half-sugar Giant White .. .. | 10·37 | 2·16 |

Inspector Reid reports: Wet weather prevailed during November and December, with the result that weeds got a hold owing to the ground being too wet for intercultivation. It was not till well on in January that the plots could be hoed. The roots rapidly improved afterwards.

*Manurial and Variety Tests, conducted at Special School for Boys, Otekaike.*

The soil in the area selected was uniform in character, being a light free soil on a sand and shingle subsoil, and situated about thirty miles from the sea-coast. It was in grass for five years prior to 1909, when it was broken up and planted in potatoes in 1910. For the present experiments it was ploughed 7 in. deep on 4th September, 1911; disc-harrowed twice and tine-harrowed (four strokes) early part of September; disc-harrowed and tine-harrowed (two strokes), middle of October, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot, and one treated with lime. The fertilizers applied were according to a design formulated by the Chief Agricultural Chemist. The variety of seed sown was Sutton's Prize-winner. In the variety test no fertilizers were used. Plots in manurial test one-tenth acre each. The seeds and fertilizers were drilled in on the flat in rows 30 in. apart—manurial test,

21st October, 1911; variety test, 24th October, 1911. The tests were initiated under favourable conditions. Intercultivation was given during the early growth of the crop. The roots were pulled and weighed on 22nd June, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 37·12 | 15·71 | Loss, 8·54 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 41·74 | 9·42 | ,, 3·92 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 41·83 | 11·39 | ,, 3·83 |
| 4 | No manure .. .. .. | .. | 45·66 | 9·72 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 40·16 | 8·93 | Loss, 5·50 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 39·38 | 12·37 | ,, 6·28 |
| 7 | Lime, 40 cwt. .. .. .. | 2 0 0 | 37·32 | 8·44 | ,, 8·34 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 44·58 | 11·19 |
| 2 | ,, Monarch Yellow Globe .. .. | 40·26 | 9·23 |
| 3 | ,, Brock's Yellow Intermediate .. .. | 41·25 | 9·82 |
| 4 | Webb and Son's New Lion Yellow Intermediate .. .. | 35·16 | 9·62 |
| 5 | ,, New Golden King .. .. .. | 30·83 | 12·17 |
| 6 | ,, Kinver Yellow Globe .. .. .. | 34·37 | 11·49 |
| 7 | ,, Monarch Yellow Globe .. .. .. | 36·73 | 10·80 |
| 8 | Sutton's Yellow Globe .. .. .. .. | 39·87 | 11·39 |
| 9 | ,, Devon Yellow Globe .. .. .. .. | 38·69 | 9·23 |
| 10 | ,, Golden Tankard .. .. .. .. | 23·57 | 12·57 |
| 11 | ,, Mammoth Long Red .. .. .. .. | 30·64 | 14·93 |
| 12 | ,, Crimson Tankard .. .. .. .. | 21·41 | 6·48 |
| 13 | ,, Sugar Mangold .. .. .. .. .. | 33·00 | 10·21 |
| 14 | ,, Prize-winner .. .. .. .. .. | 31·42 | 6·68 |
| 15 | Montgomery and Co.'s New-Zealand-grown Long Red .. | 41·64 | 15·91 |
| 16 | ,, New-Zealand-grown Golden Tankard .. | 19·64 | 5·50 |
| 17 | ,, Elvethian Long Red .. .. | 33·39 | 15·91 |
| 18 | ,, Half-sugar Giant Red .. .. | 33·59 | 12·76 |
| 19 | ,, Half-sugar Giant Rose .. .. | 31·43 | 11·59 |
| 20 | ,, Half-sugar Giant White .. .. | 19·05 | 7·66 |
| 21 | ,, Corner's Yellow Globe .. .. | 20·62 | 5·89 |

Inspector Reid reports: The manurial test was inaugurated under favourable conditions; all plots brairded well. Small birds, however, did much damage to the young plants, nipping leaves off and in many instances pulling the plants out by the roots. Owing to the continuous rains in the month of December, weeds, especially fat-hen, got away, the ground being too wet for cultivation or weeding. The variety test was conducted under similar conditions to the manurial. All varieties brairded well, but later on received a severe check from the cold wet weather that supervened. All varieties were free from disease.

*Manurial and Variety Tests, conducted by R. C. Gillies, Hakataramea.*

The soil in the area selected was uniform in character—a black loam on a clay and stony subsoil. For five years prior to 1909 it was in grass, and was then broken up and afterwards sown in wheat in 1910. For present experiments the wheat stubble was disc-harrowed four times and tine-harrowed four times at end of September, 1911; ploughed and tine-harrowed 20th October, 1911. In the manurial tests the area was divided into five manurial, one unmanured as a test plot, and one treated with lime. The fertilizers applied were according to a formula designed by the Chief Agricultural Chemist. The variety of seed sown on all plots was Sutton's Prize-winner. Plots one-tenth acre each. In the variety test no fertilizers were used. The seeds and fertilizers were drilled in on the flat under favourable conditions, drills 30 in. apart, on 28th October, 1911. The roots were pulled and weighed in July, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 19·44 | 12·64 | Gain, 4·86 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 17·50 | 3·88 | ,, 2·92 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 22·36 | 7·76 | ,, 7·78 |
| 4 | No manure .. .. .. | .. | 14·58 | 4·86 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 18·47 | 8·75 | Gain, 3·89 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 17·50 | 4·86 | ,, 2·92 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 25·28 | 6·80 | ,, 10·70 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. | 17·28 | 3·88 |
| 2 | ,, Monarch Yellow Globe .. .. | 15·98 | 2·59 |
| 3 | ,, Brock's Yellow Intermediate .. | 10·80 | 2·16 |
| 4 | Webb and Son's New Lion Yellow Intermediate .. | 16·42 | 3·88 |
| 5 | ,, New Golden King .. .. .. | 12·10 | 2·37 |
| 6 | ,, Kinver Yellow Globe .. .. .. | 14·69 | 2·59 |
| 7 | ,, Monarch Yellow Globe .. .. .. | 13·39 | 2·59 |
| 8 | Sutton's Yellow Globe .. .. .. .. | 11·64 | 2·16 |
| 9 | ,, Devon Yellow Globe .. .. .. | 10·80 | 1·94 |
| 10 | ,, Golden Tankard .. .. .. | 12·10 | 2·16 |
| 11 | ,, Mammoth Long Red .. .. .. | 14·69 | 4·32 |
| 12 | ,, Crimson Tankard .. .. .. | 16·82 | 4·32 |
| 13 | ,, Sugar Mangold .. .. .. .. | 16·82 | 3·88 |
| 14 | ,, Prize-winner .. .. .. .. | 17·71 | 5·18 |
| 15 | Montgomery and Co.'s New-Zealand-grown Long Red .. | 15·55 | 3·88 |
| 16 | ,, New-Zealand-grown Golden Tankard .. | 12·96 | 4·32 |
| 17 | ,, Elvethian Long Red .. .. | 17·28 | 8·21 |
| 18 | ,, Half-sugar Giant Red .. .. | 9·50 | 3·88 |
| 19 | ,, Half-sugar Giant Rose .. .. | 14·26 | 6·05 |
| 20 | ,, Half-sugar Giant White .. .. | 9·07 | 4·75 |
| 21 | ,, Corner's Yellow Globe .. .. .. | 13·39 | 5·18 |

## Oamaru District.

*Variety Test, conducted by J. Macpherson, Totara Estate, Oamaru.*

The land in the area selected was uniform in character, being a rich black volcanic soil on a limestone formation. It was in wheat in 1909, in potatoes in 1910. For the present experiment it was ploughed in June, 1911; ploughed, tine-harrowed twice, and rolled first half of October, 1911. The seeds were sown in raised drills, 28 in. apart, under favourable conditions, on 14th October, 1911. No fertilizers were applied. The crop was pulled and weighed on 20th May, 1912. Results:—

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 21·62 | 3·24 |
| 2 | ,, Monarch Yellow Globe | 24·30 | 3·24 |
| 3 | ,, Golden Globe | 27·00 | 3·24 |
| 4 | ,, Champion Orange Globe | 29·70 | 3·78 |
| 5 | ,, Brock's Yellow Intermediate | 35·11 | 3·78 |
| 6 | ,, Select Golden Tankard | 27·00 | 3·24 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 38·35 | 3·78 |
| 8 | ,, New Golden King | 34·03 | 3·78 |
| 9 | ,, Kinver Yellow Globe | 35·11 | 3·78 |
| 10 | ,, Monarch Yellow Globe | 35·11 | 3·24 |
| 11 | ,, Long Red Mammoth | 36·73 | 3·78 |
| 12 | ,, New Smithfield Yellow Globe | 35·11 | 3·24 |
| 13 | Sutton's Yellow Globe | 38·88 | 3·78 |
| 14 | ,, Devon Yellow Globe | 34·03 | 3·24 |
| 15 | ,, Golden Tankard | 32·41 | 4·32 |
| 16 | ,, Mammoth Long Red | 37·81 | 4·32 |
| 17 | ,, Crimson Tankard | 35·65 | 2·70 |
| 18 | ,, Sugar Mangold | 36·73 | 3·24 |
| 19 | ,, Prize-winner | 39·43 | 4·32 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 37·81 | 4·32 |
| 21 | ,, New-Zealand-grown Long Red | 35·65 | 3·24 |
| 22 | ,, New-Zealand-grown Golden Tankard | 27·00 | 3·24 |
| 23 | ,, Elvethian Long Red | 27·10 | 3·24 |
| 24 | ,, Half-sugar Giant Red | 27·00 | 3·24 |
| 25 | ,, Half-sugar Giant Rose | 35·11 | 3·24 |
| 26 | ,, Half-sugar Giant White | 34·57 | 3·24 |
| 27 | ,, Corner's Yellow Globe | 35·65 | 3·78 |

Inspector Taylor reports: The cold wet season and want of sunshine was against good yields.

*Manurial and Variety Tests, conducted at Waitaki Boys' High School, Oamaru.*

The soil in the experimental area was a light clay with a clay subsoil, and had been cropped out. It was in grass for some years prior to 1910, when it was ploughed up and a crop of potatoes taken. For present experiment it was ploughed in August, 1911; disc- and tine-harrowed twice in September; grubbed and hoed, 13th October, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot, and one treated with lime. Plots one-twentieth acre each. The fertilizers applied were according to a scheme designed by the Chief Agricultural Chemist. The variety of seed sown was Sutton's prize-winner. The seeds and fertilizers were drilled in on 13th October, 1911; drills 28 in. apart. In the manurial test the first sowing did not come away well, and the plots were resown again on 14th November, 1911. The roots were pulled and weighed on 15th May, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 53·50 | 5·00 | Gain, 21·09 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 51·90 | 3·70 | ,, 19·49 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 55·09 | 2·12 | ,, 22·68 |
| 4 | No manure .. .. .. | .. | 32·41 | 2·40 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 59·15 | 3·60 | Gain, 26·74 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 45·40 | 4·00 | ,, 12·99 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 64·80 | 2·16 | ,, 32·39 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 43·75 | 2·70 |
| 2 | ,, Monarch Yellow Globe .. .. .. | 30·79 | 2·16 |
| 3 | ,, Golden Globe .. .. .. .. | 43·75 | 3·24 |
| 4 | ,, Brock's Yellow Intermediate .. .. | 32·41 | 2·16 |
| 5 | ,, Select Golden Tankard .. .. .. | 43·75 | 3·24 |
| 6 | Webb and Son's New Lion Yellow Intermediate .. .. | 39·97 | 3·78 |
| 7 | ,, New Golden King .. .. .. | 23·76 | 2·16 |
| 8 | ,, Kinver Yellow Globe .. .. .. | 42·13 | 3·24 |
| 9 | ,, Monarch Yellow Globe .. .. .. | 42·13 | 3·24 |
| 10 | ,, Long Red Mammoth .. .. .. | 39·97 | 3·78 |
| 11 | Sutton's Yellow Globe .. .. .. .. .. | 45·37 | 3·24 |
| 12 | ,, Devon Yellow Globe .. .. .. .. | 37·20 | 2·70 |
| 13 | ,, Golden Tankard .. .. .. .. | 43·75 | 3·77 |
| 14 | ,, Mammoth Long Red .. .. .. .. | 45·37 | 3·77 |
| 15 | ,, Crimson Tankard .. .. .. .. | 43·75 | 3·24 |
| 16 | ,, Sugar Mangold .. .. .. .. .. | 43·75 | 3·77 |
| 17 | ,, Prize-winner .. .. .. .. .. | 45·37 | 3·19 |
| 18 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 27·50 | 2·16 |
| 19 | ,, New-Zealand-grown Long Red .. | 43·75 | 2·70 |
| 20 | ,, New-Zealand-grown Golden Tankard .. | 27·50 | 2·16 |
| 21 | ,, Elvethian Long Red .. .. | 16·20 | 2·16 |
| 22 | ,, Half-sugar Giant Red .. .. | 40·50 | 3·19 |
| 23 | ,, Half-sugar Giant White .. .. | 32·40 | 2·70 |
| 24 | ,, Half-sugar Giant Rose .. .. | 42·13 | 3·24 |
| 25 | ,, Corner's Yellow Globe .. .. | 43·75 | 2·70 |

Inspector Taylor reports: The leaf-miner affected the leaves for some short period, but they rapidly recovered, and the crop made good headway thereafter.

*Manurial and Variety Tests, conducted by A. H. Copland, Ardgowan.*

The soil in the experimental area was as nearly uniform in character as possible—a light clay loam with a clay subsoil. It was in grass six years previous to being ploughed, February, 1911, for present experiment. It was disced twice in April; tine-harrowed twice in May; cultivated three times in August; tine-harrowed four times in September, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot, and one treated with lime. Plots one-tenth acre each. The fertilizers applied were according to a scheme designed by the Chief Agricultural Chemist.

The seed sown was Sutton's Prize-winner. In the variety test no fertilizers were used. The seeds and fertilizers hand-drilled in on 6th October, 1911; drills 28 in. apart. The roots were pulled and weighed on 15th May, 1912. Results :—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 47·53 | 2·16 | Gain, 1·62 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 48·07 | 2·16 | „ 2·16 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 50·77 | 2·70 | „ 4·86 |
| 4 | No manure .. .. .. | .. | 45·91 | 2·16 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 44·20 | 2·16 | Loss, 1·71 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 47·53 | 2·16 | Gain, 1·62 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 35·65 | 1·62 | Loss, 10·26 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 46·99 | 2·16 |
| 2 | „ Monarch Yellow Globe* .. .. .. | 46·45 | 2·16 |
| 3 | „ Golden Globe .. .. .. .. | 43·75 | 2·16 |
| 4 | „ Champion Orange Globe .. .. .. | 45·91 | 2·70 |
| 5 | „ Brock's Yellow Intermediate .. .. | 43·75 | 2·16 |
| 6 | „ Select Golden Tankard .. .. .. | 46·99 | 2·70 |
| 7 | Webb and Son's New Lion Yellow Intermediate* .. .. | 41·05 | 2·16 |
| 8 | „ Kinver Yellow Globe* .. .. .. | 39·43 | 2·16 |
| 9 | „ Monarch Yellow Globe* .. .. .. | 39·97 | 2·16 |
| 10 | „ New Golden King* .. .. .. | 41·05 | 2·16 |
| 11 | „ Long Red Mammoth .. .. .. | 35·65 | 1·62 |
| 12 | „ New Smithfield Yellow Globe .. .. | 43·75 | 2·16 |
| 13 | Sutton's Yellow Globe .. .. .. .. | 39·97 | 2·16 |
| 14 | „ Devon Yellow Globe .. .. .. .. | 34·57 | 2·16 |
| 15 | „ Golden Tankard .. .. .. .. | 35·65 | 2·16 |
| 16 | „ Mammoth Long Red* .. .. .. .. | 37·27 | 2·16 |
| 17 | „ Crimson Tankard .. .. .. .. | 35·11 | 2·16 |
| 18 | „ Sugar Mangold .. .. .. .. .. | 35·65 | 2·16 |
| 19 | „ Prize-winner* .. .. .. .. .. | 42·13 | 2·16 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 35·11 | 2·16 |
| 21 | „ New-Zealand-grown Long Red .. | 35·65 | 2·16 |
| 22 | „ New-Zealand-grown Golden Tankard .. | 37·81 | 2·70 |
| 23 | „ Elvethian Long Red .. .. | 33·80 | 2·70 |
| 24 | „ Half-sugar Giant Red .. .. | 37·81 | 2·16 |
| 25 | „ Half-sugar Giant Rose .. .. | 39·97 | 2·16 |
| 26 | „ Half-sugar Giant White .. .. | 37·27 | 1·62 |
| 27 | „ Corner's Yellow Globe* .. .. | 37·27 | 2·16 |

Inspector Taylor reports: The varieties marked with an asterisk were affected with the leaf-miner more so than the others, but it did not retard the growth.

*Manurial and Variety Tests, conducted by John Mahoney, Whitston, Oamaru.*

The soil in the experimental area was as nearly uniform as possible in character—a heavy black loam on a clay and sand subsoil. It was in pasture for a number of years prior to being ploughed 4 in. deep for present experiment on 20th July, 1911; disc-

harrowed twice, cultivated twice; tine-harrowed three times and ploughed 7 in. deep in August; tine-harrowed three times in September, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot. Plots one-tenth acre each. The fertilizers applied were according to a scheme designed by the Chief Agricultural Chemist. The seed sown was Sutton's Prize-winner. In the variety test no fertilizers were applied. The seeds and fertilizers were drilled in under favourable conditions on 10th October, 1911; drills 28 in. apart. The crop was pulled and weighed on 23rd May, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 64·82 | 4·86 | Gain, 5·41 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 72·38 | 5·40 | „ 12·97 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 64·82 | 4·86 | „ 5·41 |
| 4 | No manure .. .. .. | .. | 59·41 | 5·40 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 64·82 | 5·40 | Gain, 5·41 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 73·46 | 5·40 | „ 14·05 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. .. | 55·09 | 4·32 |
| 2 | „ Monarch Yellow Globe .. .. .. | 63·74 | 4·32 |
| 3 | „ Golden Globe .. .. .. .. | 46·45 | 3·78 |
| 4 | „ Champion Orange Globe .. .. .. | 64·82 | 4·86 |
| 5 | „ Brock's Yellow Intermediate .. .. | 70·22 | 4·86 |
| 6 | „ Select Golden Tankard .. .. .. | 64·82 | 4·86 |
| 7 | Webb and Son's New Lion Yellow Intermediate .. .. | 58·33 | 5·40 |
| 8 | „ „ Kinver Yellow Globe .. .. .. | 69·14 | 5·40 |
| 9 | „ Monarch Yellow Globe .. .. .. | 75·62 | 5·40 |
| 10 | „ New Golden King .. .. .. | 50·77 | 2·70 |
| 11 | „ Long Red Mammoth .. .. .. | 67·52 | 5·40 |
| 12 | „ New Smithfield Yellow Globe .. .. | 70·22 | 4·86 |
| 13 | Sutton's Yellow Globe .. .. .. .. | 57·25 | 4·86 |
| 14 | „ Devon Yellow Globe .. .. .. .. | 61·40 | 4·86 |
| 15 | „ Golden Tankard .. .. .. .. | 50·77 | 2·70 |
| 16 | „ Mammoth Long Red .. .. .. .. | 62·12 | 5·40 |
| 17 | „ Crimson Tankard .. .. .. .. | 53·47 | 2·70 |
| 18 | „ Sugar Mangold .. .. .. .. .. | 51·85 | 2·70 |
| 19 | „ Prize-winner .. .. .. .. .. | 70·22 | 5·40 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 77·78 | 5.40 |
| 21 | „ New-Zealand-grown Long Red .. | 48·61 | 2·70 |
| 22 | „ New-Zealand-grown Golden Tankard .. | 42·67 | 2·70 |
| 23 | „ Elvethian Long Red .. .. | 45·37 | 2·70 |
| 24 | „ Half-sugar Giant Red .. .. | 37·81 | 2·70 |
| 25 | „ Half-sugar Giant Rose .. .. | 37·81 | 2·70 |
| 26 | „ Half-sugar Giant White .. .. | 40·51 | 2·70 |
| 27 | „ Corner's Yellow Globe .. .. | 54·01 | 3·24 |

Inspector Taylor reports: This was the best mangel crop in North Otago this season. The leaves of No. 10 in variety test were badly affected with rust. Some of the varieties ran to seed badly owing to wet season.

## PALMERSTON SOUTH DISTRICT.

*Manurial and Variety Tests, conducted by A. D. Gillies, Hampden.*

The soil in the experimental area was as nearly uniform as possible in character, and was a clayey loam on a light gravelly subsoil. It was in grass for some years prior to 1909, when ploughed up and cropped with oats in 1910. For the present experiments it was cultivated 9th March, 1911; ploughed 9 in. deep, 10th May; cultivated twice, 9th September; tine-harrowed twice and land thrown into raised drills, 11th October, 1911. In the manurial test the area was divided into five manurial plots, one unmanured as a test plot, and one treated with lime. Plots one-tenth acre each. The fertilizers applied were according to a design formulated by the Chief Agricultural Chemist. The seed sown was Sutton's Prize-winner. In variety test 2 cwt. Argyle guano per acre was applied, at a cost of 9s. 6d. per acre. The seeds and fertilizers were drilled in on 12th October, 1911; drills 27 in. apart. The tests were initiated under favourable conditions. The roots were pulled and weighed on 9th August, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 30·35 | 3·14 | Gain, 11·52 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 26·68 | 2·75 | „ 7·85 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 34·53 | 2·09 | „ 15·70 |
| 4 | No manure .. .. .. | | 18·83 | 2·61 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 35·58 | 4·45 | Gain, 16·75 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 24·59 | 1·83 | „ 5·76 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 21·45 | 3·92 | „ 2·62 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. .. | 23·80 | 3·40 |
| 2 | „ Monarch Yellow Globe .. .. .. | 20·66 | 1·57 |
| 3 | „ Golden Globe .. .. .. .. | 17·52 | 3·66 |
| 4 | „ Champion Orange Globe .. .. .. | 19·88 | 4·19 |
| 5 | Brock's Yellow Intermediate .. .. | 21·45 | 3·66 |
| 6 | „ Select Golden Tankard .. .. .. | 8·63 | 2·09 |
| 7 | Webb and Son's New Lion Yellow Intermediate .. .. | 22·50 | 2·88 |
| 8 | „ New Golden King .. .. .. | 25·63 | 3·92 |
| 9 | „ Kinver Yellow Globe .. .. .. | 25·76 | 2·61 |
| 10 | „ Monarch Yellow Globe .. .. .. | 23·54 | 2·75 |
| 11 | „ Long Red Mammoth .. .. .. | 9·41 | 2·09 |
| 12 | „ New Smithfield Yellow Globe .. .. | 24·06 | 3·14 |
| 13 | Sutton's Yellow Globe .. .. .. .. | 20·93 | 1·57 |
| 14 | „ Devon Yellow Globe .. .. .. .. | 21·45 | 2·61 |
| 15 | „ Golden Tankard .. .. .. .. | 15·69 | 2·09 |
| 16 | „ Mammoth Long Red .. .. .. .. | 15·69 | 2·35 |
| 17 | „ Crimson Tankard .. .. .. .. | 14·12 | 1·30 |
| 18 | „ Sugar Mangold .. .. .. .. .. | 17·26 | 3·40 |
| 19 | „ Prize-winner .. .. .. .. .. | 14·91 | 1·83 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 13·08 | 2·22 |
| 21 | „ New-Zealand-grown Long Red .. | 19·88 | 3·14 |
| 22 | „ New-Zealand-grown Golden Tankard .. | 12·55 | 3·14 |

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 23 | Montgomery and Co.'s Elvethian Long Red .. .. | 15·95 | 5·23 |
| 24 | ,, Half-sugar Giant Red .. .. | 20·93 | 5·23 |
| 25 | ,, Half-sugar Giant White .. .. | 21·45 | 3·40 |
| 26 | ,, Half-sugar Giant Rose .. .. | 19·88 | 3·14 |
| 27 | ,, Corner's Yellow Globe .. .. | 37·15 | 2·88 |

Inspector Dalgliesh reports: Brairded well, very slow growth afterwards; weather too cold and wet. Corner's Yellow Globe was far and away the best of the varieties, yielding 11 tons more than the next best result, and in some cases double and in one or two cases four times better.

*Variety Test, conducted by John Douglas's Trustees, Mount Royal Estate, Palmerston South.*

The soil in experimental area was a clayey loam on a clay and gravelly subsoil. It had been in grass for some years prior to being skim-ploughed in 1910; in turnips in 1911. For present experiment it was skimmed and ploughed 6 in. deep; cultivated twice and tine-harrowed three times in September, 1911; rolled and thrown into raised drills 30th September, 1911. The seeds were sown and fertilizers applied on 2nd October, 1911, the fertilizer used being Criterion mangold-manure, at the rate of 2½ cwt. per acre; cost, 15s. per acre. The crop was harvested on 10th June, 1912. Results:—

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 9·34 | 2·02 |
| 2 | ,, Monarch Yellow Globe .. .. .. | 16·41 | 3·03 |
| 3 | ,, Golden Globe .. .. .. | 12·62 | 3·53 |
| 4 | ,, Champion Orange Globe .. .. .. | 11·87 | 3·03 |
| 5 | ,, Brock's Yellow Intermediate .. .. | 15·15 | 2·77 |
| 6 | ,, Select Golden Tankard .. .. | 13·89 | 3·28 |
| 7 | Webb and Son's New Lion Yellow Intermediate .. .. | 14·14 | 2·29 |
| 8 | ,, New Golden King .. .. .. | 11·87 | 3·53 |
| 9 | ,, Kinver Yellow Globe .. .. .. | 11·36 | 2·52 |
| 10 | ,, Monarch Yellow Globe .. .. .. | 12·62 | 2·77 |
| 11 | ,, Long Red Mammoth .. .. .. | 10·86 | 4·54 |
| 12 | ,, New Smithfield Yellow Globe .. .. | 6·06 | 1·26 |
| 13 | Sutton's Yellow Globe .. .. .. .. .. | 11·61 | 2·52 |
| 14 | ,, Devon Yellow Globe .. .. .. .. | 15·91 | 3·03 |
| 15 | ,, Golden Tankard .. .. .. .. | 11·87 | 3·03 |
| 16 | ,, Mammoth Long Red .. .. .. .. | 18·18 | 4·79 |
| 17 | ,, Crimson Tankard .. .. .. .. | 8·08 | 3·53 |
| 18 | ,, Sugar Mangold .. .. .. .. .. | 11·36 | 3·28 |
| 19 | ,, Prize-winner .. .. .. .. .. | 22·73 | 4·04 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 15·40 | 3·53 |
| 21 | ,, New-Zealand-grown Long Red .. | 14·14 | 4·54 |
| 22 | ,, New-Zealand-grown Golden Tankard .. | 13·13 | 4·79 |
| 23 | ,, Elvethian Long Red .. .. | 8·58 | 4·29 |
| 24 | ,, Half-sugar Giant Red .. .. | 7·57 | 3·28 |
| 25 | ,, Half-sugar Giant White .. .. | 6·81 | 3·03 |
| 26 | ,, Half-sugar Giant Rose .. .. | 11·36 | 3·03 |
| 27 | ,, Corner's Yellow Globe .. .. | 15·91 | 3·53 |

Inspector Dalgliesh reports: This experiment did badly from the start. The area was somewhat exposed to cold winds, and the continued wet prevented intercultivation being given.

*Manurial and Variety Tests, conducted by M. Dalgliesh, Palmerston South.*

The soil in the experimental area was fairly uniform in character—marly with a clay subsoil. It was in grass four years prior to 1909, when it was ploughed up and a crop of wheat taken; in turnips in 1910. For present experiment it was ploughed

and disc-harrowed in September, 1911; tine-harrowed and rolled, 10th October, 1911. In the manurial test the area was divided into five manurial, one unmanured as a test plot, and one treated with lime. Plots one-tenth acre each. The fertilizers applied were according to scheme designed by the Chief Agricultural Chemist. The variety of seed sown was Sutton's Prize-winner. The seeds and fertilizers were drilled in on 13th October, 1911, under favourable conditions; drills 28 in. apart. In the variety tests special mangold-manure was applied at the rate of 4 cwt. per acre; cost, £1 2s. per acre. The roots were pulled and weighed on 14th August, 1912. Results:—

MANURIAL TEST.

| Plot. | Manures per Acre. | Cost per Acre. | Weight of Crop per Acre. | | Effect of Manuring. |
|---|---|---|---|---|---|
| | | | Roots. | Tops. | |
| | | £ s. d. | Tons. | Tons. | Tons. |
| 1 | Superphosphate, 2 cwt. .. | 0 9 6 | 20·71 | 4·04 | Gain, 10·11 |
| 2 | Superphosphate, 2 cwt.; island guano, 1 cwt. | 0 14 3 | 17·17 | 3·03 | „ 6·57 |
| 3 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt. | 1 9 3 | 18·69 | 3·28 | „ 8·09 |
| 4 | No manure .. .. .. | .. | 10·60 | 2·02 | .. |
| 5 | Superphosphate, 2 cwt.; island guano, 1 cwt.; sulphate of potash, 1 cwt.; salt, 1 cwt. | 1 11 6 | 22·22 | 4·54 | Gain, 11·62 |
| 6 | Same as plot 5, with dried blood, 1 cwt. | 1 18 6 | 18·69 | 8·09 | „ 8·09 |
| 7 | Lime, 40 cwt... .. .. | 2 0 0 | 20·20 | 4·04 | „ 9·60 |

VARIETY TEST.

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tops. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate .. .. | 16·92 | 3·53 |
| 2 | „ Monarch Yellow Globe .. .. .. | 18·18 | 3·03 |
| 3 | „ Golden Globe .. .. .. .. | 16·92 | 5·30 |
| 4 | „ Champion Orange Globe .. .. .. | 25·76 | 6·56 |
| 5 | „ Brock's Yellow Intermediate .. .. | 20·20 | 4·54 |
| 6 | „ Select Golden Tankard .. .. .. | 17·93 | 5·55 |
| 7 | Webb and Son's New Lion Yellow Intermediate .. .. | 15·91 | 4·04 |
| 8 | „ New Golden King .. .. .. | 17·17 | 7·07 |
| 9 | „ Kinver Yellow Globe .. .. .. | 22·22 | 6·56 |
| 10 | „ Monarch Yellow Globe .. .. .. | 18·43 | 4·04 |
| 11 | „ Long Red Mammoth .. .. .. | 17·17 | 6·56 |
| 12 | „ New Smithfield Yellow Globe .. .. | 18·43 | 3·03 |
| 13 | Sutton's Yellow Globe .. .. .. .. .. | 19·70 | 3·79 |
| 14 | „ Devon Yellow Globe .. .. .. .. | 20·71 | 4·54 |
| 15 | „ Golden Tankard .. .. .. .. | 16·67 | 5·80 |
| 16 | „ Mammoth Long Red .. .. .. .. | 19·44 | 6·06 |
| 17 | „ Crimson Tankard .. .. .. .. | 14·14 | 2·58 |
| 18 | „ Sugar Mangold .. .. .. .. .. | 15·66 | 3·79 |
| 19 | „ Prize-winner .. .. .. .. .. | 12·12 | 3·53 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe .. | 19·70 | 5·05 |
| 21 | „ New-Zealand-grown Long Red .. | 14·65 | 7·57 |
| 22 | „ New-Zealand-grown Golden Tankard .. | 11·61 | 2·52 |
| 23 | „ Elvethian Long Red .. .. | 11·87 | 4·04 |
| 24 | „ Half-sugar Giant Red .. .. | 13·63 | 7·07 |
| 25 | „ Half-sugar Giant White .. .. | 11·11 | 4·29 |
| 26 | „ Half-sugar Giant Rose .. .. | 12·12 | 4·80 |
| 27 | „ Corner's Yellow Globe .. .. | 20·72 | 5·05 |

Inspector Dalgliesh reports: Heavy rains after sowing caused a hard crust to form on surface. Mangels brairded very slowly, and owing to the continual wet weather it was impossible to keep down the weeds.

### Balclutha District.

*Variety Test, conducted by Joseph Smith, Stirling.*

The soil in the experimental area, a sandy loam on a free subsoil, was uniform in character. Formerly it was in heavy bush and was practically virgin soil. For the present experiment it was ploughed 6 in. deep on 10th July, 1911; tine-harrowed three times in August; rolled with Cambridge roller and tine-harrowed in September, 1911. The mangels were sown in raised drills on 30th September, 1911; drills 28 in. apart. No fertilizers were applied. The roots were pulled and weighed on 13th June, 1912. Results:—

| Plot. | Variety. | Crop per Acre: Roots. |
|---|---|---|
| | | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 45·20 |
| 2 | " Monarch Yellow Globe | 33·84 |
| 3 | " Golden Globe | 30·30 |
| 4 | " Champion Orange Globe | 28·78 |
| 5 | " Brock's Yellow Intermediate | 36·61 |
| 6 | " Select Golden Tankard | 38·63 |
| 7 | Webb and Son's New Lion Yellow Intermediate | 58·84 |
| 8 | " New Golden King | 44·69 |
| 9 | " Kinver Yellow Globe | 53·03 |
| 10 | " Monarch Yellow Globe | 38·13 |
| 11 | " Long Red Mammoth | 36·11 |
| 12 | " New Smithfield Yellow Globe | 33·33 |
| 13 | Sutton's Yellow Globe | 46·46 |
| 14 | " Devon Yellow Globe | 48·99 |
| 15 | " Golden Tankard | 47·47 |
| 16 | " Mammoth Long Red | 46·71 |
| 17 | " Crimson Tankard | 23·48 |
| 18 | " Sugar Mangold | 28·28 |
| 19 | " Prize-winner | 44·69 |
| 20 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 48·23 |
| 21 | " New-Zealand-grown Long Red | 39·14 |
| 22 | " New-Zealand-grown Golden Tankard | 32·57 |
| 23 | " Elvethian Long Red | 32·57 |
| 24 | " Half-sugar Giant Red | 42·42 |
| 25 | " Half-sugar Giant White | 26·51 |
| 26 | " Half-sugar Giant Rose | 51·51 |
| 27 | " Corner's Yellow Globe | 52·27 |

### Sutton District.

*Variety Test, conducted by Walter Scott, Sutton.*

The soil in the experimental area, a black loam on a sandy subsoil, was uniform in character. It had been in native pasture, and was surface-sown with English grasses, but uncultivated until ploughed up for this experiment on 10th August, 1911. It was disc- and tine-harrowed twice and rolled during August, disc- and tine-harrowed twice during September, 1911. The seed was sown on ridged drills without fertilizers on

20th October, 1911; drills 28 in. apart. The crop was harvested on 8th July, 1912. Results:—

| Plot. | Variety. | Crop per Acre. | |
|---|---|---|---|
| | | Roots. | Tons. |
| | | Tons. | Tons. |
| 1 | Hurst and Son's Brock's Red Intermediate | 3·42 | 1·42 |
| 2 | ,, Monarch Yellow Globe | 3·14 | 1·28 |
| 3 | ,, Brock's Yellow Intermediate | 3·14 | 1·71 |
| 4 | Webb and Son's New Lion Yellow Intermediate | 3·71 | 3·28 |
| 5 | ,, New Golden King | 5·57 | 2·42 |
| 6 | ,, Kinver Yellow Globe | 6·14 | 2·71 |
| 7 | ,, Monarch Yellow Globe | 7·42 | 4·14 |
| 8 | ,, Long Red Mammoth | 9·42 | 2·57 |
| 9 | Sutton's Yellow Globe | 9·14 | 2·71 |
| 10 | ,, Devon Yellow Globe | 9·28 | 1·71 |
| 11 | ,, Golden Tankard | 5·00 | 2·42 |
| 12 | ,, Mammoth Long Red | 7·14 | 2·57 |
| 13 | ,, Crimson Tankard | 6·42 | 3·47 |
| 14 | ,, Sugar Mangold | 10·28 | 2·28 |
| 15 | ,, Prize-winner | 7·85 | 4·85 |
| 16 | Montgomery and Co.'s New-Zealand-grown Yellow Globe | 8·42 | 3·28 |
| 17 | ,, New-Zealand-grown Long Red | 5·71 | 3·14 |
| 18 | ,, New-Zealand-grown Golden Tankard | 8·14 | 5·14 |
| 19 | ,, Elvethian Long Red | 7·28 | 3·71 |
| 20 | ,, Half-sugar Giant Red | 7·71 | 2·71 |
| 21 | ,, Half-sugar Giant Rose | 6·28 | 2·57 |
| 22 | ,, Half-sugar Giant White | 9·71 | 2·85 |
| 23 | ,, Corner's Yellow Globe | 12·14 | 2·85 |

## ANALYSES OF MANURES USED IN SOUTHERN ROOT EXPERIMENTS.

### Composition of Ingredients of Mixtures.

Superphosphate: 16·5 per cent. soluble phosphoric anhydride; 1·3 per cent. insoluble phosphoric anhydride.

Bonedust: 3·9 per cent. insoluble nitrogen; 21·25 per cent. insoluble phosphoric anhydride.

Potash sulphate: 0·52 per cent. di-potassic oxide (potash).

Guano, Malden: 27·5 per cent. insoluble phosphoric anhydride.

### Quantities applied in Pounds per Acre.

*Otago and Southland.*

| Plot. | Nitrogen: Insoluble. | Phosphoric Anhydride. | | Potash Salt. | |
|---|---|---|---|---|---|
| | | Soluble. | Insoluble. | Soluble. | Insoluble. |
| 1 | .. | 27·75 | 2·18 | .. | .. |
| 2 | .. | 55·50 | 4·36 | .. | .. |
| 3 | 3·28 | 37·00 | 20·70 | .. | .. |
| 4 | .. | .. | .. | .. | .. |
| 5 | 3·28 | 37·00 | 20·70 | 14·60 | .. |
| 6 | 1·64 | 18·50 | 10·35 | 7·30 | .. |
| 7 | 1·64 | 18·50 | 10·35 | 7·30 | 14·0 |
| 8 | .. | .. | 61·60 | .. | .. |

In Canterbury one-half the above quantities were applied.

# GREEN-MANURING.

In a recent bulletin of the International Institute of Agriculture some interesting facts are furnished of the manurial system in vogue in Japan. The most striking feature of the Japanese method of restoring depleted fertility is the universal use of green manures. For this purpose many crops are grown, principally legumes—such as Soya bean and clover. The "genya," or "weed lands," mostly in elevated positions, are largely utilized for growing green manure (apparently to be cut and carted on to arable land). In 1903, of a total area of 3,451,890 acres of such lands (exclusive of several districts), the area devoted to green manure was 1,176,973 acres, or 34·09 per cent, with an average output of 62½ cwt. per acre. Another feature of the Japanese system is to improve the physical condition of certain soils by applying sand to those of a clayey nature and clay to soils rich in humus. Burning is also applied to lands having an excess of organic matter. At the same time artificial fertilizers are being increasingly employed. The imports of these last year amounted in value to £5,248,700, or over 10 per cent. of the total value and imports. The increase over the imports of 1910 amounted to no less than £1,379,300, more than the gain made by any other group of imported articles. The chief increase was in nitrogenous manures, to take the place of the decreasing local supplies of fish manures and oil-cakes. A Japanese fertilizer industry has been developed, and superphosphates, sulphate of ammonia, and calcium cyanamide are being produced.

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In the South Island just on 3,300 co-operative experimental plots, to be conducted on nearly 200 farms in conjunction with the Department, have so far been arranged for. This does not take into account the experiments to be conducted in co-operation with the Department at high schools.

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The British Vice-Consul at Caracas reports that Venezuela offers a favourable market for tinned butter. The greater part of the butter used in the country is imported, the lower qualities for cooking purposes chiefly from the United States, and the better-class butters for table use almost exclusively from Denmark, though a certain amount also comes from France. The butter is packed in tins of 28 lb., 14 lb., 400 grammes, 200 grammes, and, more rarely, 460 grammes and 230 grammes capacity, and the price realized in Denmark is approximately 1s. 5d. to 1s. 8d. per pound of 460 grammes. The import duty is about 4¼d. per kilogramme, or 2d. per pound gross weight.

# BRITISH AGRICULTURE.

The British Board of Agriculture has made a departure in the publication of statistics showing the output of agricultural land in Great Britain, the number of persons engaged in agriculture, and the motive power employed. The total value of the farm crops grown in 1908 was calculated at £125,000,000, of which £46,000,000 represented the portion actually sold, the balance principally going to feed stock and maintain the fertility of the land. The value of corn-offals, oil-cakes, and feeding-stuffs, and of artificial fertilizers, used in Great Britain in 1907 was approximately £26,000,000. The permanent labour employed, excluding occupiers, was represented by 1,173,000: this not taking into account those temporarily employed. The mechanical motive power used in farming was generated by 34,450 engines of various descriptions, with a total horse-power of 213,525. The grand total of all the descriptions of lands in Great Britain is 47,796,323 acres. The gross output would amount to about £3 per acre on this total; but the range was very wide in different classes of land. Thus, the output per acre on the 2,750,000 acres under woods was about 6s., while for the 13,000,000 acres of rough grazings it was not more than 10s. to 12s. On the 32,000,000 acres of cultivated land (of which nearly 17,500,000 were grass) the gross output, it is stated, probably amounted on an average to nearly £4 per acre.

## THE CALL OF THE LAND.

In making an appeal for pieces of land to be attached to rural schools in Italy, an appeal which by the way resulted in no less than 2,257 blocks of land being presented in less than six months, the Director-General of Education in Italy said, "Let us return to the fields! This is the invitation which from all time men of superior understanding and of generous hearts have repeated to the Italians. Be it granted to us to join them; let us enamour the rising generation with the land! From the little garden, where the country teacher shall practically teach the rudiments of agriculture, upwards through the technical schools and the professional institutes, may the knowledge of agriculture continually be reinforced and elevated; everywhere may there reawaken the Virgilian affection for rustic labour."

During the first period of the present year fat bullocks realized the highest prices in modern times, as far as the United States is concerned. Thousands were selling at from £1 18s. to £1 19s. 5½d. per hundredweight.

# PASTURES AND CROPS.

## SEPTEMBER.

Officers of the Fields and Experimental Farms Division of the Department report as follows on the condition of the pasture and crops during the past month :—

Bay of Islands.—The weather for September has been anything but satisfactory for the farmer. The whole month, with the exception of a few days, has been a succession of northerly gales, with rain, and at the time of writing (29th) a terrific gale with cold rain is raging. The weather is the worst I have seen in this district, and has greatly retarded farming operations.—*W. J. Dunlop.*

Auckland.—The weather during the month has been particularly disagreeable for farming operations. The long spell of cold biting winds, accompanied by bitter hail-storms, and the incessant wet wintery conditions which prevailed, checked the growth of grass and other forage crops considerably. However, there is a moderately large area of land laid down in new grass this season, while fertilizers have been freely applied to both the new and old pastures. No doubt when the warm weather sets in the flush of grass will be abundant. Farmers who have made provision for winter and spring feed for their stock find it greatly to their advantage. During the late bad weather they had no difficulty in keeping their dairy herds and other stock in the pink of condition ; moreover, they find it brings them in an all-round increase in their milk-supply. Generally speaking, stock have come through the winter remarkably well owing to the climatic conditions. There is an excellent lambing all over the district. Dairy factories are nearly all in full operation. The constant rains have made the roads difficult to travel over. From reports the prospects for the dairy industry never looked brighter. New potatoes are finding their way into the market, the demand for which is greater than the supply.—*R. Rowan.*

Te Aroha.—The weather has been boisterous during the month, with an abnormal fall of rain and cold winds, but at the time of writing there are indications of more-settled weather. Ploughing has been almost at a standstill owing to the sodden state of the land, and there is practically no growth. Owing to abundant supplies of hay and exceptionally good turnip crops, stock have wintered well.—*J. L. Morris.*

Waikato.—September has been the roughest and wettest month experienced in this district for years, all farm-work being at a standstill owing to the continual rain. Milking is now in full swing, but the wet is much against good results. Early-sown crops are also backward from the same cause. Old pastures have freshened up, but require more warmth and a respite from the cold winds. Stock are generally looking well for such a wet season.—*C. E. McPhee.*

Cambridge.—With the exception of four or five fine days, the weather during September was very stormy and unpleasant. Showery every day, and heavy rains at frequent intervals. Between the 19th and 26th the equinoctial gales held sway, accompanied by heavy rain-showers. Only one slight frost during the month. Considering the rough weather, grass has made a very fair growth, and given a little warm weather will come away quickly. General prospects for a favourable season are very promising. —*A. A. Clapcott.*

King-country.—The past month has had the heaviest rainfall for this winter. Rain fell on twenty-nine consecutive days. The roads here now are in an almost impassable condition. All field-work on farms has been suspended, and the preparation of the ground for spring crops has been delayed.—*B. Bayly.*

Rangitikei.—September has been a very wet and cold month, the rainfall being 6·22 in. Rain fell on twenty-four days, with a maximum of 1·2 in. on the 27th.—*A. P. Smith.*

Ohakune.—After the favourable weather of last month and the amount of rain that had fallen on previous months farmers entertained hopes of a dry spring, but, on the contrary, the month ended with its reputation for wetness. The rains over the greater part of the month, though heavy, were of a warm character, consequently pastures have made fair progress. On the bush areas lambing is satisfactory, the ewes reaching the stage of accouchement in good condition. The lambs arrived before the really bad weather set in, and the shelter bush afforded a certain amount of protection. Flock-owners have been less fortunate on the plains (Karioi-Rangipo), lambing being later—in the midst of the rough weather. The continual rain has greatly retarded tilling operations, and a few weeks favourable weather would be greatly appreciated.—*P. Barry.*

Mangaweka.—During the first week in September the weather was mild and warm, favourable for grass and lambing. After the 7th the spell was broken, and up till the 28th the rainfall was very heavy, accompanied by cold winds. Feed has been plentiful for stock. Lambing is now well advaced and record percentages are spoken of. Owing to the continuous wet weather, agricultural and other work has been kept back. Rain fell on sixteen days.—*J. A. Melrose.*

New Plymouth.—September has been a very wet, cold month. The rainfall has been very heavy and the wind cold, especially during the latter part of the month, several heavy showers of hail falling. All farm-work has been at a standstill, and there is still much grain to be sown.—*R. E. Fairfax-Cholmeley.*

Stratford.—A very wet, cold, and boisterous month—hardly a day without some rain—but the feed in the pastures is ahead of that of the corresponding month last year, with the result that the milk-supply shows an increase on this time last year. There has been a very good lambing, and so far very small mortality. Agricultural work is well in hand.—*Austin F. Wilson.*

Hawera.—Very boisterous weather prevailed throughout the month. Westerly to south-westerly winds with recurring heavy rain and hail showers was the daily experience up to the last day of the month. Present conditions, however, seem to indicate fairer and more settled weather, which will be much appreciated.—*A. J. Glasson.*

Wanganui.—September was phenomenally wet and boisterous. Showers—frequently heavy ones—fell intermittently throughout the greater part of the month, rainless days being few. The temperature generally was low, and occasionally decidedly wintry. The sodden condition of the soil wherever it is of a tenacious and heavy nature, and the absence of warmth, have not been conducive to the growth of grass, consequently pastures are not yet producing much feed. They are green, but on the whole bare. On the lighter and more porous lands, confined almost entirely to the coastal districts, where better natural circulation of moisture obtains, feed is more plentiful, and only needs warmth to ensure an abundant supply.—*C. Watson.*

Feilding.—The weather during September has been exceptionally boisterous and cold, the river having been running bank-high. Still, no damage has been recorded. It was fortunate that the lambing season was well advanced, and the lambs strong enough to stand the inclemency of the weather. Cropping and gardening operations are at a standstill. With reference to the dairy industry, the intake at the factories has been disappointing, more especially towards the latter end of the month, the supply being small. The provision made to assist in the upkeep has been inadequate. Good prices are ruling, and yet farmers will not rise to the occasion. Where cows are being rugged, the covers should be taken off, especially on fine days during winter and early spring.—*William Dibble.*

Hastings.—During the first half of September the weather was extremely mild, and the growth of grass, &c., phenomenal. Equinoctial gales retarded growth until the 29th, when we had a much-needed rainfall, and at present prospects for the coming season are good.—*J. G. Parker.*

Waipukurau.—September has been a splendid growing month, and where pastures are not overstocked there is a plentiful supply of feed. Warm showers followed by sunny days were the order till the 24th, when high winds were experienced till the 28th, heavy cold rain setting in on this date and continuing up to the 30th. The rivers and creeks were in high flood. Stock that have been fairly well wintered are making good progress, those in poor condition feeling the effect of the new grass more or less.—*H. O. M. Christie.*

Pahiatua.—There were a large number of wet days last month, and the wet condition of the soil retarded farming operations. The rainfall for month was 9·17 in. Rain fell on twenty-three days, the maximum fall being 0·10 in. on the 10th. Rainfall for September, 1911, was 3·73 in., and rain fell on nineteen days.—*T. Bacon.*

North Wairarapa.—The beginning of the past month was ideal as regards spring growth, but the past fortnight changed considerably: high winds intermixed with cold rains, which had a tendency to stay all growth. There is a fair amount of white crops sown, which give every promise of turning out well. The lambing season is about over, and from all accounts the percentage will be about the same as usual.—*J. S. Rankin.*

Masterton.—During the first two weeks of last month the weather was ideal and a very early spring was anticipated, but equinoctial gales sprang up and checked the growth of grass, and what is wanted now is more sun and less wind. Snow fell on the 29th. It is years since such favourable conditions prevailed for lambing, which, from what I hear, should constitute a record. Crops are now all sown, and several oat crops are well above ground. The starlings, it is said, are very fond of the grass-grub, and do an immense amount of good in lessening this pest.—*T. C. Webb.*

South Wairarapa.—During the month of September we have had various changes which have consisted of heavy showers of rain, alternating with a few fine days, during which period the grass and crops made good growth. During the latter end of the month snow fell on the high country and cold strong winds were experienced. Farmers anticipate a heavy lambing this season.—*S. C. Ivens.*

Wellington.—A few warm days at the beginning of the month following August's springlike weather promised well for pastures, farm, and garden; but the end of the first week saw a sharp lapse into winter again, and cold gales with frequent heavy rains from all points of the compass have prevailed, stock keenly feeling the change and farm-work being hindered by the wet condition of the soil.—*G. H. Jenkinson.*

Blenheim.—September has been an unusually wet and boisterous month, with rivers in almost continual flood, and frequent falls of snow on the high country. The month has been almost free from frosts with no very cold weather on low country. Consequently it has been an excellent growing period for both pastures and cereals, but the frequent rains have kept farm-work back on the heavy lands.—*F. H. Brittain.*

Nelson.—The weather for the month has been very showery, with heavy rains on several occasions. On the whole it has been too wet, thereby hindering farming operations, and retarding the growth of grain crops on low-lying lands. As the dry and warm weather comes on the pastures and crops should do well, as there will be plenty of moisture in the land to keep them growing.—*Gilbert Ward.*

Hokitika.—Last month was the worst experienced on the West Coast for many years, and, unfortunately, has put work of all kinds back. The rainfall to date (28th) has been 18·01 in., the maximum being on the 19th, when 2·52 in. was recorded. There has been twenty-four wet days to date, and by present appearances there will be a continuance of wet weather. There have been several heavy hail-showers and thunderstorms, with snow on the high country. Although the weather has been exceedingly rough there seems to be a good percentage of lambs, and I have not heard of any number being lost. Cattle seem to have fared badly and are in poor condition. All work in connection with farming, and also plots of ground we were getting in readiness for carrying out experiments on, are put back, which will make it late in the season for spring sowing.—*H. J. Walton.*

Kaikoura.—Pastures have made good growth during the month, and there is now a fair amount of feed about for stock. The grain crops are also coming away nicely and altogether the country districts have a prosperous appearance. A cold snap occurred on the 29th, otherwise the weather throughout the month was congenial to the growth of plant-life.—*William S. Goodall.*

Lincoln.—During September weather favourable for farming operations prevailed, enabling the work of the sowing of late grain crops to be pushed ahead. In early districts a considerable acreage has already been sown in peas. Good lambing weather was experienced, and the percentage of lambs is satisfactory. Although there are evidences of the ravages of the grass-grub in many fields both of light and medium lands, still it may be said that pastures generally are very good for the time of year.—*J. G. Scott.*

Rangiora.—The prevalence of westerly winds during September caused a series of local storms round the hills, the rainfall for the month being 2·19 in.; the greatest

fall was on the 27th. Sunshine total for the month, 108 hours 48 minutes. There were four days' frosts—viz., 3rd, 11th, 24th, and 30th. That on the 30th was fairly severe. the ice being ⅛ in. thick. The rain has caused some damage, having washed out some of the oats in some low-lying paddocks. The lambing has been exceedingly good, and I have heard of very little mortality.—*A. Hughes.*

Ashburton.—Splendid growing weather was experienced throughout the month. Slight rains fell on fifteen days, total rainfall being 2·01 in., as compared with 3·52 in. last year. A splendid lambing is spoken of—the best for a good number of years. On the light lands some early-sown oat crops will have to be sown again owing to the vigorous working of the grass-grub, although the grub is not general this year. On the heavy land, where the soil was waterlogged in the winter, the grub is practically extinct. —*C. Branigan.*

Kurow.—Damp muggy weather prevailed during the early part of September, with cold changeable weather during the remainder of the month. Heavy rain fell on the 27th, and a good spring is now assured in this locality. There is a splendid show of grass on the low lands towards the coast, but the high country on the Upper Waitaki is still very bare. Lambing is general at present, and a big percentage is expected. The past winter has been exceptionally mild, and runholders are looking forward to a very profitable season. All stock have wintered well, and early-sown cereals are making good progress.—*G. Reid.*

Waimate.—The weather during the past month was changeable, strong winds and occasional showers prevailing, accompanied by, at close of month, a considerable snowfall on high country. The land has dried up sufficiently to allow farmers to get to work in connection with the later sowing of cereals, although, owing to the wet autumn and winter, farmers have not been able to put in as much grain as would otherwise have been the case, and sowing down in grass is more general than customary. Pastures on high and low country are looking well—a better spring-time is not usual—grass is coming away exceedingly well. Co-operative experimental areas of wheat and oats are coming along nicely, though warmer weather would greatly assist growth generally. Several farmers are for the first time going in for lucerne, realizing more than ever its productiveness as a forage plant and the quality of its hay, while chou moellier is receiving more attention from owners of milking-herds. Lambing is general, and high percentages are noticeable. There is every assurance of a favourable season for the farmer and grazier.—*F. A. Macdonald.*

Oamaru.—Last month was all that could be desired from the farmers' and pastoralists' point of view—mild weather generally and an absence of high nor'-westers. Feed is in abundance everywhere, and the lambings are, so far, exceptionally good. Farmers have been very busy indeed putting in oats and potatoes, and preparing their lands for root and forage crops. Present conditions point to a splendid season in North Otago, and altogether the "man on the land" is jubilant. A large number of farms still continue to change hands—people coming from north and south. Rainfall for the month, 1·92 in.—*S. M. Taylor.*

Palmerston South.—Excellent spring weather has prevailed during the month, although we have had occasional frosts. Good rains fell at intervals. Good growth has been made in pastures and crops. Oat-sowing is not yet finished. Farmers in most cases have an oversupply of turnips and mangels. Early potato crops are being put in.—*C. S. Dalgliesh.*

Dunedin.—With the exception of a few days about the 19th of the month, which were cold and rough, September all through has been mild and springlike, and general indications point to an earlier season than last year. The pastures in this district are looking very well, and this will help dairy-farmers very much, as they have to depend on a good grass season. This is purely a dairying district, only a very few patches of oats being sown.—*J. R. Renton.*

Mosgiel.—Rain fell on eight days during the month. There was very cold weather from the 25th to the 29th, otherwise the month was very mild, with plenty of growth. There is abundance of feed throughout the district. Owing to the scarcity of stock farmers are late in getting their turnips eaten off, and this will keep them back with the ploughing. All stock are looking well and healthy, and farmers are expecting to have a record lambing this season.—*H. McLeod.*

Strath Taieri.—During the early part of the month we had beautiful spring weather, and grass made a rapid growth. Farm-work is being carried on apace, the land

being in good working-condition. During the latter part there have been several squalls from the south-west, which have checked growth somewhat. In flocks where lambing has started they appear to be doing very well.—*W. Scott.*

MANIOTOTO.—September was a fairly good month. There is every prospect of a splendid season and plenty of feed for stock. On the high country the winged thistle is making a good show, as are also the native grasses. Rabbits are well down in the high country, and this will give the grass a chance to come away fine and clean. The Tasmanian spiked blue-grass is spreading, and is looking well, covering many patches that were formerly bare of vegetation.—*A. T. N. Simpson.*

CLYDE.—A good deal of rain fell last month, which was very acceptable for this part of the country. In some parts there has been too much, and farmers are not able to get their ground ploughed. A very good spring is bringing pastures away, and the growth is very noticeable.—*Thomas N. Baxter.*

BALCLUTHA.—The past month has been very favourable for general farm-work, and the sowing of oats and wheat is being pushed ahead, though the area under these crops this year will be much smaller than last year, owing to the continued wet during winter and early spring. There are still abundance of turnips, and, as it is impossible to get them eaten off, some are being ploughed down. Draught horses are in great demand in the district at present. A large area is being sown in potatoes this season. The pastures are very slow in coming away, owing to the cold snaps and light frosts. All stock seem to have wintered well.—*Hugh A. Munro.*

OWAKA.—During September the weather was on the whole favourable, but the last week of the month was stormy and cold, and on the 30th a severe frost was experienced. Considerable areas of oats have been sown, and the early crops are growing well. Pastures generally are satisfactory, but many paddocks in the district have been allowed to deteriorate, and now require to be top-dressed before a satisfactory return can be expected or obtained from them.—*R. McGillivray.*

TAPANUI.—The weather is still anything but satisfactory for agricultural work, and crops are going in slowly, as much of the ground is still very wet. Pastures are coming away nicely, especially young grass. Roxburgh and Miller's Flat districts are looking exceptionally well, and there is promise of abundance of feed for the coming season in these localities.—*W. J. McCulloch.*

GORE.—During the earlier part of the month the weather was favourable and farmers made good progress with ploughing, sowing, &c. Grass also came on well, but during the past fortnight or ten days we have had colder weather with heavy rains, which has checked the growth of grass and has also delayed farm-work. Turnips are still being eaten off. The spring is earlier than last year, and although we have had a check during the past week or two, if given favourable weather now, feed will soon be plentiful. The most serious effect of recent rains has been the check to sowing of crops.—*B. Grant.*

LUMSDEN.—For the first week of September we had some nice spring weather, and farmers could be seen sowing wheat and oats, but towards the middle of the month there was a change, and we experienced snow on the hills and very heavy rains, and all rivers and creeks are in flood, the rivers rising higher than they have been known to for years.—*W. S. S. Cantrell.*

INVERCARGILL.—The weather during September has been broken, and a good deal of rain has fallen. The rivers throughout this district have been in flood. The young grass paddocks are looking well, but on older pastures feed is not too plentiful. Farm-work has been greatly retarded owing to the wet state of the land, and unless we have a spell of settled weather soon a good deal of the oats will be late sown. Very little wheat is likely to be grown this season. Total rainfall for the month, 4·45 in. Rain fell on fifteen days.—*J. R. Whyborn.*

OTAUTAU.—The weather during the month has not been too good for farming operations. On the 16th and 21st very heavy rain fell, on the former date or the day following one of the biggest floods for many years being experienced. Consequently the land got too wet for agricultural purposes, many farmers being heavy losers by having their crops washed away. A considerable time must elapse before the land is dry enough to get the teams on again. A late harvest is expected.—*H. F. Dencker.*

# THE FRUIT CROP.

Officers of the Orchards, Gardens, and Apiaries Division report as follows regarding orchard conditions for the month of September :—

Whangarei.—September was cold, wet, and windy; a westerly wind continued through the month almost without cessation, and with but few exceptions was accompanied daily by heavy rain and hail showers. Generally speaking, however, fruit-trees are not so backward as might be anticipated, but young trees in the more-exposed positions have suffered. There are good prospects of an average crop of both stone and pip fruits. Peaches are showing well all round. Loquats scarce.—*J. W. Collard.*

Auckland North.—The month has been very boisterous throughout, high winds, with frequent heavy showers, interfering seriously with spraying operations. Market is well supplied with southern, Tasmanian, Canadian, and American apples. Present conditions indicate good crops.—*W. C. Thompson.*

Auckland South.—A wet and boisterous month. Rain fell almost every day, with occasional heavy falls of hailstones. Peach leaf-curl is very bad where spraying has not been carried out, but where Bordeaux has been used is fairly free from this disease. Everything points to a heavy crop of apricots, as they have set exceedingly well considering the state of the weather. Peaches have set fairly well, and Japanese plums are light to good. Everything is well in hand for the spraying for codlin-moth, of which there will be a good deal done, as growers are realizing the benefit of using the arsenate of lead.—*N. R. Pierce.*

Hamilton.—A wet and boisterous month. Notwithstanding this, peaches and nectarines appear to be setting their fruit freely. Pears in many places are showing a wealth of bloom. Gooseberries give promise of an abundant harvest.—*T. E. Rodda.*

Wanganui.—The prospects at present of the stone-fruit crop in this district—peaches and plums—are poor to medium. The buffeting peaches got last year evidently made heavy crops this season an impossibility. Plums promise to be a lighter crop, although if weather-conditions are favourable they will probably be a finer sample. Apples and pears are flowering well, but the boisterous weather must affect the earlier varieties of the pear in unsheltered localities; otherwise the promise of the pip-fruit crop is excellent. —*W. C. Hyde.*

Manawatu and Wairarapa.—High winds and wet weather were a great handicap to orchard-work in September, consequently much cultivation has still to be done. Most trees are showing an abundance of blossom, and should better weather set in a good setting of fruit will result.—*G. Stratford.*

Hastings.—The weather during the month has been very rough and stormy, but there is no noticeable damage to the setting fruit. All orchards are looking extremely well. Apricots have set in abundance and also peaches. This, so far, has been a record season for bloom, and if the future weather-conditions are favourable the season's fruit crop should be a very heavy one.—*J. A. Campbell.*

Nelson.—Rain fell more or less almost every day, greatly retarding orchard-work generally, especially tree-planting, which, however, is nearly finished. Pear and apple trees are coming into bloom, and promise good crops. Tomatoes are now being planted out pretty extensively. Fruit shipments are getting light, and will soon be finished for the season.—*J. H. Thorp.*

Christchurch.—During the past month the weather has been fine, and orchard-work is well in hand. Markets are well supplied with local apples. Every promise of a record season, almost every variety of fruit blooming profusely.—*W. J. Courtier.*

Dunedin.—All fruit-trees are showing an abundance of blossom, and everything points to a good crop this coming season, although it is rather early yet to predict anything, as there is always the possibility of the fruit not setting. Most growers are paying careful attention to their pruning methods this year, but there is still room for improvement in places. Some fine specimens of apples are still coming to market from Central Otago, and these command good prices.—*W. T. Goodwin.*

# WEATHER DURING SEPTEMBER.

## DISTRICT NOTES.

D. C. Bates.

*Chiefly from Telegraphic Reports.*

District.

1, 2. The weather during the month was stormy and wet, both the number of days and the total fall being considerably above the average, the latter by as much as 50 per cent. in most parts. Electrical conditions occurred on several days, a particularly severe thunderstorm being experienced in the neighbourhood of Auckland on the 15th.

3. Heavy rain fell on the 4th and 5th, and generally wet and boisterous conditions prevailed throughout the month, there being very few days on which no rainfall was recorded, and the total was much above the mean.

4. The rainfall was everywhere above the average for September, but the excess varied to a marked extent. Some places recorded a very slight excess, while others, more particularly in the hilly country, show an increase of 50 per cent. above. Squally and showery conditions predominated, the prevailing winds being from a westerly direction.

5. Weather-conditions similar to district number 3, but the percentage above the average was generally greater in this district.

6. Rainfall above the average by about 25 per cent., the heaviest falls occurring on the 5th and 27th. Very squally weather was experienced between the 11th and 24th, and the month throughout was unsettled and wet.

7, 8. The prevailing wind was westerly, and consequently the total monthly fall was slightly less than the average, generally by about 8 per cent. Except on a few days in the beginning and towards the end of the month fair weather prevailed, although somewhat windy at times.

9, 10. A month of strong winds and extremely showery weather. Precipitation exceeded the average by from 30 to 60 per cent. in parts, and snow fell on the higher levels on several occasions, especially on the 24th and 28th.

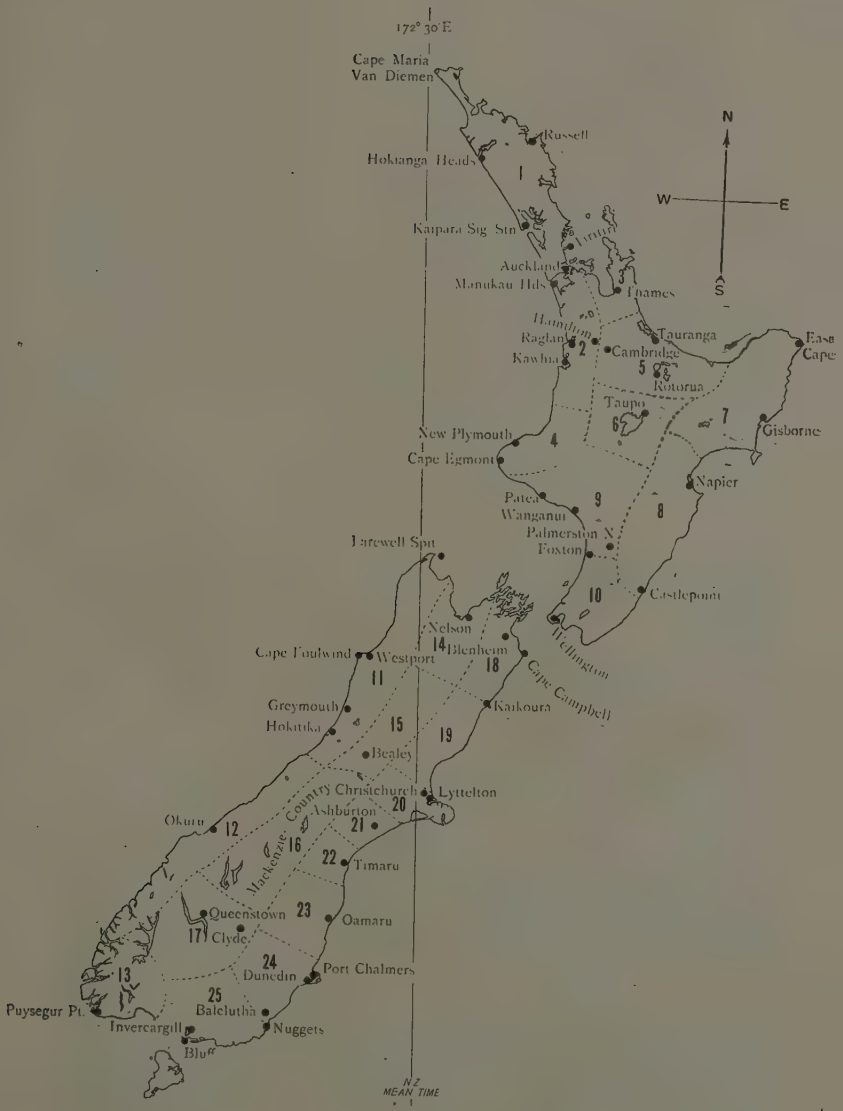
11, 12, 13. The whole of the western districts had an excessive rainfall, some portions, especially in the south, recording over double the average amount. Stormy weather was frequently in evidence, and some severe thunderstorms were experienced about the middle of the month.

14. Most stations in this district had more than the average rainfall, but the excess varied greatly, and at a few places the mean fall was not attained. The weather was changeable and showery, with occasional strong winds.

15. An extremely wet month, over double the average rainfall being recorded. Heavy rain fell frequently, and snow also on numerous occasions.

16, 17. Although rain-showers were frequent no heavy falls occurred, and the total was usually somewhat below the average for September.

18. In the northern portion of this district the rainfall was above the average by 50 per cent., but elsewhere it was generally about the mean, and at a few places slightly below. The heaviest fall was generally on the 19th, but precipitation was usually of a showery nature.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Oamaru
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Dunedin
Port Chalmers
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Puysegur Pt.
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Invercargill
Nuggets
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NZ MEAN TIME

District.

19, 20, 21, 22. Usually about 20 per cent. below the average rainfall, no particularly heavy rainfalls occurring during the month. Changeable and showery weather predominated, especially during the first half of the month, the longest period of fair weather occurring between the 21st and 26th.

23. The weather, although cloudy, was almost free from strong winds. Showery days were frequent, and a heavy fall of rain about the 19th brought the total slightly above the average at most stations.

24, 25. Much dull weather prevailed after the 8th, and precipitation was above the average, especially in district 25, where some stations recorded double. On the 19th and 21st very stormy conditions were experienced.

SUMMARY.

During the month of September the weather was dominated by an unusual number of low-pressure systems, anticyclones of a well-developed character being entirely absent or else centred too far north to cause settled weather for any appreciable period. Westerly areas of low pressure were frequent and of an extensive and intense type, resulting in a predominance of high westerly winds, in consequence of which districts with a westerly aspect suffered a remarkably excessive rainfall, many portions recording more than double their average for the month, while the eastern districts, particularly Canterbury and Hawke's Bay, recorded less than their usual amount.

Between the 2nd and the 6th an ex-tropical cyclone passing in the north accounted for heavy rain at times in the northern and east coast districts, and misty and wet conditions generally. On the nights of the 14th and 16th, in conjunction with an extensive westerly "low," depressions of a secondary type caused severe thunderstorms in the vicinity of Auckland and Wellington respectively. Electrical conditions were also experienced on several occasions during the middle of the month in Westland. Generally the month was characterized by squally and showery weather, most districts having, besides a larger rainfall, a greater number of rainy days than the average for the month.

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The British Government has purchased a property in Surrey for the purpose of establishing an experimental station for treating the diseases of cattle.

The haystacks at Weraroa Experimental Farm, illustrated in the last number of the *Journal*, were thatched with cocksfoot after the seed of this had been threshed out.

No brand of fertilizer can give satisfactory results when the conditions are not favourable. The land should receive proper cultivation, and there should be sufficient moisture in the soil to dissolve the plant-foods.

The Ontario Hydro-electric Commission has been demonstrating in the Niagara district the possibility of farming by electricity. The Commission purposes to order two portable threshing outfits, which will tour the country this autumn, giving demonstrations of electric power in threshing, corn-cutting, and ploughing.

According to a census of the dairy industry of Canada the butter business of that country exhibited a much larger increase in the first decade of the century than did the industry of cheese-making. The butter-output in 1900 was 36,056,739 lb., valued at £1,448,194; whereas in 1910 it was 59,875,097, valued at £3,136,513. In 1900 the cheese manufactured amounted to 220,833,269 lb., valued at £4,444,286; in 1910 the output was 231,012,798 lb., valued at £4,324,131.

# ANSWERS TO CORRESPONDENTS.

## Lucerne and Hay.

Mr. J. J. McKay, Harihari, Westland, writes,—

1. I propose to try lucerne in a 5-acre field which will be sown down in oats and clover this spring. Would it be suitable to basic slag this field? If so, what are the next steps after this crop is cut off, and when should the lucerne be sown? The land is of fair average West Coast sort, and when in maiden state grew cabbage-tree, nigger-heads, totara, and black scrub. This will be its first ploughing. It has shingle bottom, and the depth of soil varies, with small or fine clay, but the soil in places seems to grow white cover and *Lotus major* well. What variety of corn or maize would be likely to do well here, there being occasional frosts to the end of November generally? What area would you advise me to experiment with, method of preparing ground, and manures, if any, in same field after the lucerne?

2. In making oaten hay, would it be a suitable method to cock in 80 lb. cocks the same day as cut, leave for four or five days to cure, and then remove to barn or stack, as Hoard's Dairyman advises the American farmer to do with clover and lucerne, using cock-covers?

The Director of the Fields and Experimental Farms Division replies,—

Lucerne-growing: Last month's *Journal* contained particulars of the Department's offer of assistance to farmers in the growing of lucerne. It is recommended that you should not at first attempt to grow lucerne on so large an area as 5 acres. It would be far better to confine your efforts to 1 acre. It is observed that your land will be sown in oats and clover this spring. For this crop basic slag is a suitable manure. If the seeding is successful, the second cut of clover will come on after the oats are cut. This may be fed off during winter. The land would be ploughed and cross-ploughed in the spring and maintained in as clean a condition as possible, and the lucerne sown at about this month next year. You advise that the land is fair average West Coast, and that this is its first ploughing. In most districts it is usually accepted that the crop after the first ploughing is not generally very profitable. It is suggested that further cultivation should be undertaken before laying this land down in lucerne. Lucerne requires a well-cultivated, clean soil. If, however, as you say, white cover and *Lotus major* appear to flourish, the land may be sweet and respond to less cultivation.

You ask what variety of corn or maize would be likely to do well there, there being frosts to the end of November. It is presumed that the maize is for green feed to be cut and carted during summer. Almost any variety of maize answers this purpose. An article on this subject, written by Mr. Drysdale, Manager of the Weraroa Experimental Farm, appeared in the *Journal* of July, 1911.

You inquire "What area would you advise me to experiment with, method of preparing ground, and manures, if any, in the same field after the lucerne?" I do not quite understand this inquiry. Lucerne is a crop that lasts for many years—seven years would be but a short life. The area to experiment with should in no case exceed 1 acre. In the *Journal* for May, 1911, you will find a description of the plan known as the "eight-plot system." This, with modifications according to the locality and conditions, is availed of by many farmers in the Dominion. It may appear somewhat complicated at first, but careful perusal will show that it can be operated fairly easily.

Oaten hay: The means most adopted in New Zealand—and undoubtedly the most suitable—is to cut oats with a reaper-and-binder. The crop is then easily handled. When set in stooks it withers and dries in ten to twelve days without much attention. If the oats are cut and made into hay in the same way as grass the crop is more difficult to handle and more expensive than when bound in sheaves. Oats are seldom sufficiently dried for stacking under about twelve days. The methods mentioned in *Hoard's Dairyman* are those applicable to much lighter crops than those usually produced in New Zealand, and it must be remembered that the

summer in America is very much fiercer than in New Zealand. There has been no experience in this country of the use of covers for haycocks. This would be expensive on an extended area. The covers would be difficult of maintenance in a climate that is windy. The recommendation to avail yourself of the reaper-and-binder is repeated.

## Silver-beet.

Subscriber, Geraldine, writes,—

Would you kindly inform me through the *Journal* whether you think silver-beet would be suitable to fatten lambs upon. I propose to grow it on fair, stony land. Rape on this land in a dry season blights badly. I have heard that silver-beet has been successfully grown by one of the freezing companies on light land. Do you think this class of land suitable for the purpose? Where is the seed procurable, and the price? What quantity of seed should be sown per acre, sowing on the flat—drills 14 in. apart?

The Fields and Experimental Farms Division replies,—

Silver-beet: This forage plant was brought to the notice of farmers in the South Island by the Department of Agriculture four years ago as likely to take the place of rape and turnips in the feeding and fattening of stock, through its not being susceptible to the insect pests and fungoid diseases which devastate these crops so frequently. Small areas were sown and tested up to 1911–12, when seed was distributed in small quantities to eighteen farmers. The largest areas were sown on the Canterbury Frozen Meat Company's property at Belfast, and Mr. John Macpherson's farm, Totara Estate, Oamaru.

At Belfast the seed was sown on the 9th October, 1911, in drills 21 in. apart, and the plants thinned out to about 12 in. in the rows. The land was manured with Belfast rape-fertilizer at the rate of 3 cwt. per acre. On the 29th February the leaves of a portion of the area were cut and weighed, giving an approximate yield of 51·72 tons per acre. On the 12th March the experimental area was stocked with sheep, the carrying-capacity being at the rate of 243 sheep per acre for fourteen days. Mr. Hopkins, the company's manager at Belfast, reported on the crop as follows: "It is the best forage crop of all, beating Thousand-headed kale, two varieties of rape, chou moellier, and Buda kale. The sheep ate it greedily, and evidently improved upon it, which was very apparent. The sheep did not run all over it, but went straight ahead eating to the ground as they went. Since the stock has been removed I have given intercultivation between the rows, and the plants have made a splendid second growth." On account of abundance of feed this has not been fed off a second time yet. The growth is good, and will be stocked again in September, when there will be further results to record.

At Totara there is a splendid crop, but owing to an abundance of other sheep-feed this season it has not been fed off yet. The experiments indicate that it is a valuable plant for sheep-feed, being thoroughly hardy, of continuous growth, and produces heavy crops on good soil.

Information as to where seed is procurable, and the price, can be obtained on inquiry from the Fields Instructor, Department of Agriculture, Christchurch.

## Chou Moellier.

Mr. W. McCaldon, Opotiki, writes,—

Would you please tell me through the medium of the *Journal* when is the best time to sow chou moellier and silver-beet for winter feed, and also the correct fertilizer to use.

The Fields and Experimental Farms Division replies,—

Chou moellier and silver-beet can be sown twice a year. The first sowing should be in spring, and the second about the beginning of February. The seed should not be sown in spring until the ground is warm.

The Agricultural Chemist replies,—

For chou moellier use 1½ cwt. superphosphate and 1½ cwt. bonedust and blood per acre. For silver-beet apply 1 cwt. superphosphate, 1½ cwt. guano, ½ cwt. bonedust and blood, ½ cwt. sulphate of potash per acre.

## Ploughing.

Mr. B. C. Colbran, Wild Bush, Riverton, Southland, writes,—

Would you give me some information in regard to ploughing? Which makes the best seed-bed and is most beneficial to the ground—ploughing shallow in the autumn and leaving it stand over winter, and then ploughing deeper before sowing, or, on the other hand, ploughing deep in autumn and then shallow before sowing?

The Fields and Experimental Farms Division replies,—

In reply to this inquiry, which ploughing is more beneficial to the ground, ploughing shallow in autumn and deep in spring, or *vice versa*: Soil is naturally the most benefited by ploughing deeply, in order that the lower portion may be exposed to the air and light, and the longer that soil is so exposed the more it is ameliorated, and throughout the greater part of this country the usual process is to plough deep in autumn and light in spring before sowing the crop. This may, however, be altered from conditions arising from those of rainfall, drainage, and texture of soil, and can only be determined by the farmer himself who is thoroughly acquainted with the circumstances. Naturally procedure must be altered in dealing with stiff wet soils and those that are light and dry.

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## Buckwheat.

Subscriber, Broadfield, Canterbury, writes,—

Can you supply any information regarding buckwheat? I was thinking of trying a small area on medium land near Christchurch. What is the quantity to sow, and do you know if it is likely to shake much with wind?

The Fields and Experimental Farms Division replies,—

Buckwheat is a crop but little thought of in New Zealand, and the seed is principally made use of for poultry-feeding. A bushel of seed is recommended per acre. The plant is susceptible to frost, and should not be sown until that danger is past. It is a peculiarity of the plant that it ripens unevenly; in fact, on the same plant there may be observed the flower, the partly matured seed, and that so ripe that it is in readiness to shell. As it approaches ripening it should be carefully observed, and harvested when the greater quantity of the seed appears ripened. It is probable that it is liable to shell out from the effect of the wind. Another use of buckwheat is that of a smothering-crop. It is claimed to be one of the best for the smothering-out of weed-growths. It is free from most insect and fungoid troubles.

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## Discoloration of Swede Turnips.

Mr. W. Hay, Hilly Park, Romahapa, writes,—

Will you kindly inform me why well-grown Swede turnips should be discoloured in the centre? Is it the fault of the manure, or what?

The Fields and Experimental Farms Division replies,—

Without a knowledge of the condition of the soil it is difficult to furnish a definite answer. It may, however, be that the account of an apparently similar affection of turnips at Ruakura Farm of Instruction given in the *Journal* of July, page 34, will be of assistance. The discoloration there was very particularly marked—in fact, so much so that the Manager was naturally under the impression that some bacterial cause had been in action. As stated in that article, the plants were perfectly healthy. The cause was undoubtedly the acidity of the soil. The land had been but recently reclaimed from swamp, and the fact that roots on the portions adjoining open drains were free from discoloration is a further evidence that the cause was to be attributed to the soil and not to any affection of the root. It is probable that this would apply in your case, as in the Romahapa district there are lands somewhat similar. It is regretted that in the inquiry details are not supplied of the nature of the soil and the conditions.

## MOSS AND RUSHES.

MR. E. B. LANGFORD, Bainham, Nelson, writes,—

Would you kindly inform me through the columns of your valuable paper how to prevent moss from overrunning my land? The paddocks are getting overrun with moss and rushes. What will rid us of these pests and at the same time restore the grass to its former luxuriance? Only a very small portion of the land is as yet cleared of logs and stumps.

The Fields and Experimental Farms Division replies,—

The answer given to Mr. P. C. Neilsen, Mangamaire, in regard to the clearing of land from rushes (page 536, June issue) applies in this case. It is recommended that a test only should be made of the methods mentioned. The actual improvement of such lands cannot be assured excepting through cultivation.

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## BLACK-WATTLE.

MR. ALFRED LAKEMAN, Honikiwi, Otorohanga, writes,—

In regard to the growing of black-wattle, I should be much obliged if you would kindly inform me as to the best time to plant the seed, how it should be treated beforehand, and what kind of soil is most suitable. Also, will it grow on poor land such as manuka and fern ridges?

The Director of the Orchards, Gardens, and Apiaries Division replies as follows:—

Black-wattle (*Acacia decurrens*) seed should be sown in the spring, where the trees are to grow permanently, in well-prepared land. The quantity of seed required will be at the rate of ¾ lb. per acre. Overnight, from twelve to twenty-four hours before planting, pour boiling water into a vessel, and at once tip the wattle-seed into it. The steeping will cause germination to commence, and also the exudation of a certain amount of gum. The gum should be washed away, two or three changes of water probably being required to do so effectively. The seed should then be spread out to dry for, say, half an hour, care being taken that the exposure is not sufficiently long to do more than remove the moisture from the outside of the skin and not in any way to check the germination already commenced. If there should still be any trace of stickiness left a light sprinkling of wood-ashes will correct it. In this condition the seed can now be drilled into the prepared land to a depth of ½ in. in two rows 6 ft. apart, with bonedust added at the rate of 1 cwt. per acre. Black-wattle does well in almost any class of soil, although it succeeds best in poor dry soils at low elevations near the sea.

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## HELIANTI.

MR. CHRIS LE NOEL, Matakohe, writes,—

I should esteem it a favour if you could include an article in your next month's issue on helianti. In the *Weekly News* of August there was a short article which induced me to write my seedsman (Auckland) for a few pounds of the tubers. He wrote advising me to find out more about it before trying it, as it was a pest and could not be kept within bounds. The article mentioned above advocated planting it as a first-class food for milking-cows. No doubt many dairymen like myself are anxious to secure some fodder plant for summer, and would appreciate an article on the above-named plant on which they could rely.

The Fields and Experimental Farms Division replies,—

Helianti is very similar in habit to the Jerusalem artichoke; in fact, there is but little difference in the plants. In the present condition of knowledge regarding this plant it cannot be recommended for use on anything larger than experimental plots. Reports are being obtained from the experimental farms, and an article will appear in an early number of this *Journal*.

## "Seedy-toe" and Lice in Horses.

Messrs. Blackburne Bros., Tarata, write,—

We have a draught mare (five years old) which for some considerable time has been troubled with "seedy-toe." Apparently we have succeeded in checking the disease itself, which had made much progress, the trouble now being that the quick of the hoof is making very little growth. We have been pouring warm Stockholm tar into the cavity and then plugging up with cloth at intervals of a fortnight for the past three months or so. The hoof is not sound enough to hold a shoe. Would you kindly advise through your correspondence columns.

Also, what is the best treatment for horses affected with lice? We have tried spraying with a non-poisonous sheep-dip, but with little effect.

The Live-stock and Meat Division replies,—

Successful treatment of "seedy-toe" depends a good deal upon the cause which has produced the condition. You say the hoof is not sound enough to hold a shoe. Has she had laminitis, the so-called "founder"? This is one of the most frequent causes of the disease, and at the same time the most difficult to cure, in many cases the animal being useless for working purposes. I am afraid I cannot suggest much improvement on the treatment you have been carrying out. As a rule, after thoroughly cleaning out all the cheesy material, packing with tow and tar is all that is necessary to effect a cure. One important thing you seem to have neglected to do, and that is the application of a blister to the coronet to encourage the growth of the horn. A mild blister is preferable to a strong one: 1 part of powdered cantharides to 24 parts of lard is plenty strong enough. Clip the hair off round the coronet, and rub a little in every second day until a scurf forms. Let this shell off, then repeat. This should effect a cure if the condition is due to ordinary causes, such as too tight toe-clip, &c., but if it is the sequel of "founder" I am afraid little can be done.

With regard to the treatment of horses infested with lice, the ordinary non-poisonous coal-tar sheep-dips will kill them. Choose a warm day, and go thoroughly over the animals, rubbing the dip into the hair with a stiff brush. This will kill all the lice, but it will not kill the "nits" or eggs, and as these hatch out in about eight days, it is necessary to dress the animal again about the ninth day, and even a third time. I expect you did not do this, hence your non-success.

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## Shelter-trees.

Mr. A. R. B. Pierce, Hawera, writes,—

Would you kindly inform me through your *Journal* the best shelter-hedges to plant on land situated between Hawera and the sea-coast. I have a high boxthorn hedge around the farm, but would like to know of a (non-thorn) evergreen hedge suitable for close to house. Would black-wattle or tree-lucerne thrive on that situation as a shelter-hedge for garden and orchard? I have a lot of plants of privet, but do not know if it will stand the salt spray; or does it shed its leaves in the winter?

The Orchards, Gardens, and Apiaries Division replies,—

Black-wattle (*Acacia decurrens*) would be very suitable for shelter-planting in your district. It is best raised from seed, which should be sown in the place where the trees are to remain permanently. The seed should be steeped in hot water for about twelve hours before sowing; then well mix with dry sand or fine, dry soil to remove the stickiness and allow the seed to run freely through the hand when sowing. Tree-lucerne is liable to attacks from the "borer," and is only suitable as a temporary shelter. The privet does not shed its leaves, and should remain uninjured by any salt spray such as would affect the Hawera district. Taupata (*Coprosma baueriana*) is a vigorous grower and one of the best hedge plants for withstanding salt winds. Akeake (*Olearia Traversii*) is also deserving of mention. Of the introduced species, *Euonymus japonica*, *Eleagnus japonica*, *Escallonia rubra* are all of much value. All these shrubs, however, should be out of reach of cattle, which sometimes show a liking for their foliage.

## Miscellaneous Queries.

Mr. F. W. Corbin, Grove Road, Hastings, writes,—

Will you kindly answer the following questions for me:—

1. How much lucerne-seed do you advise to sow to the acre?

2. Is it advisable to inoculate the seed, and, if so, would the Department supply inoculated seed, and at what price per pound?

3. Which is the best variety of seed to sow—Hunter River, or is there any locally grown seed?

4. Does the Department supply seed-potatoes? If so, where are they to be obtained, and at what price per cwt.?

5. What do you advise for curing lampas in a young horse? Is it advisable to burn it out?

6. Is oil emulsified with soft-soap only as effective for spraying as oil emulsified according to the Department's instructions with carbolic acid, caustic potash, and resin?

The Fields and Experimental Farms Division replies,—

1. The usual quantity of lucerne-seed to sow to the acre is 15 lb.

2 and 3. It is advisable when sowing this seed to use inoculated soil. The inoculation is obtained by the application of soil from a well-established lucerne-field. At the present time it is found that local seed, from Marlborough, is giving good results. I have sent you a leaflet giving full particulars of the assistance given by the Department to those desirous of experimenting with lucerne. If it is your intention to participate an early application is necessary.

4. The Department has no seed-potatoes for disposal.

The Live-stock and Meat Division replies,—

5. You will get what information you require from an answer to a correspondent in the last month's *Journal*, page 334.

The Director of Orchards, Gardens, and Apiaries replies,—

6. Yes, if used soon after making; though it does not remain completely emulsified for so long a period, and therefore cannot be kept in stock for long periods.

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## Growing Fine Seed.

Mr. J. H. L. writes,—

Would you kindly let me know through your valuable paper if properly prepared soil is required for growing fine seed in a hothouse? If so, how is it prepared? I have been growing fine seed, and have been greatly troubled with small white insects.

The Orchards, Gardens, and Apiaries Division replies:—

Soil required for growing fine seed in a hothouse may be prepared by sterilization by dry heat. The soil should reach a temperature of 200° Fahr., but need not pass 210°; it should be maintained for an hour or more at a temperature exceeding 180° Fahr. After sterilization the earth should not be exposed more than necessary to rain, as plant-food rapidly begins to form and is thereby liable to be washed out.

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## Manures.

Mr. W. Davidson, Springston, Canterbury, writes,—

Could you inform me of the best manures to use for mangels, carrots, swedes, sugar-beet, and chou moellier on fairly stiff loam with heavy clay subsoil, cropped in potatoes this year without manure. At the present time the ground is almost too wet to walk on.

The Agricultural Chemist replies,—

I would recommend, for mangels, carrots, and sugar-beet, on the soil described, 1 cwt. superphosphate, 1 cwt. guano, ½ cwt. sulphate of potash, ¾ cwt. bonedust and blood per acre; for swedes and chou moellier, 1 cwt. superphosphate, ½ cwt. bonedust per acre.

# COMMERCIAL REPORTS.

## GRAIN AND SEED EXPORT.

The Commonwealth regulations governing the importation of grain and seed require that the weight of the former must not exceed 200 lb., exclusive of the sack, and that all sacks containing grain or seed must be branded with a true description of the goods and the country of origin. These regulations being considered unduly harsh on New Zealand shippers, the Department communicated with the Commonwealth Government on the matter. It was pointed out in regard to the branding that practically all the grain shipped to the Commonwealth was accompanied by a grader's certificate, descriptive of quality, which is a greater protection than the branding of the sacks required under the Commonwealth regulations. As to the weight provision, a request was made that a slight excess above the 200 lb. limit be allowed, as New Zealand shippers were in the habit of including a few pounds over to ensure full weight to the purchaser.

In his reply to the Prime Minister of New Zealand (the Hon. Mr. W. F. Massey) the Premier of the Commonwealth (the Hon. A. Fisher) expressed his regret that the Australian regulations could not be amended in the directions indicated, but pointed out that the regulations were less restrictive than had been supposed. Mr. Fisher writes,—

"I have the honour, at the instance of my colleague the Minister for Trade and Customs, to inform you that a description prescribed by regulations under the Commerce Act is required to be applied to imported agricultural seeds. This must be in the form of a principal label or brand containing a true description of the goods, and the name of country or place in which they were manufactured. It is also required that the trade description shall state the names of the seeds, and their condition as to soundness, cleanness, and newness. If any weight or quantity is set out, it must be stated as 'gross' or 'net.'

"As these requirements have been in force since 1st January, 1907, it will be seen that they are not new.

"My colleague states that agricultural seeds are, however, exempted from any marking, provided the Collector of Customs is satisfied the seed is intended solely for stock or for cage-birds; also seeds imported in small packets per post, and seeds imported otherwise than as merchandise.

"Further, if grain such as oats, maize, wheat, &c., is imported as articles to be used in the preparation of food for man, and the description—*e.g.*, 'Oats, New Zealand'—was applied, nothing further would be required.

"The matter of deciding whether grain is imported as seed, or food for stock, or as articles used in the preparation of food for man, is left to the Collector's discretion.

"With reference to the weight of bagged products, I desire to add that the question received the fullest consideration before the Proclamation (copy of which is forwarded herewith) was issued, and it is not considered desirable to alter its terms."

## NEW ZEALAND HOPS.

Under date of London, 9th August, the High Commissioner reports,—

The favourable warm weather experienced in this country during the months of April and May, followed by a period of moisture, has had the effect of materially altering the position in the hop-market. The prospect of good crops has caused buyers to be less anxious for the future, and to reduce their ideas of values. Prices have for some time been gradually receding, and have fallen from £13 for English "goldings" and £12 for Californians to from £8 to £9 and £7 to £8 respectively.

One or two shipments of New Zealand hops have come under my notice this season. These, I have been informed, were bought in the Dominion, and passed on arrival direct into consumption on account of the purchaser. Their value on the London market at the time of arrival was quoted to me at from £9 10s. to £10 per cwt. The top value here of New Zealand hops, this season, is given at £10 10s. per cwt. At present they are only worth about £8.

Brewers in this country are not at all keen to do business in New Zealand hops. This possibly arises from prejudice on the part of buyers, owing to lack of knowledge as to their character and quality, as well as to irregularity of shipments.

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## WEST CANADIAN MARKETS.

The following report, under date of Vancouver, 3rd September, has been received from the New Zealand Trade Representative on that market :—

The prospect for New Zealand butter on this market is very promising for the present season. Several importers have already made contracts for their season's supplies, although a few of the principal importers are still holding off, as they consider New Zealand exporters are quoting butter at extreme prices at such an early stage of the season. Furthermore, Vancouver commercial brokers are most energetic in their endeavours to block New Zealand butter on this market, owing to New Zealand dairy companies having contracted direct with merchants. The brokers are doing all in their power to impress the buyers that later on they will be able to offer Australian butter at a much lower price, being advised, they say, that Australia has had copious rains. The brokers also state they expect to be able to place Eastern Canadian butter of improved quality on the Western market, as several butter experts from the East have been in Vancouver inquiring into and making a study of the New Zealand butter, the quality of which gave the public such general satisfaction last season.

The brokers are determined, if possible, to regain this market for Australia and Eastern Canada. I have no doubt that some unscrupulous merchants may sell Australian butter as New Zealand.

While in conversation with several of the principal importers who brick their butter, they stated that if they do import Australian butter they will brick it and sell it in wrappers as the firm's best brand, such as "Thistle," "Cloverdale," &c. As the season advances I am quite certain that all importers will be forced to buy and stock a certain quantity of New Zealand butter, even though it costs a cent or two more than all other butters under offer.

The prices of beef and mutton having attained such a height in Australia, New Zealand exporters might be able to secure an opening on this market, if they can obtain shipping facilities and if they can quote low enough to suit the buyers. Australian exporters usually quote a price which includes freight, insurance, and exchange paid to Vancouver.

The following statements and particulars should prove beneficial to intending exporters. The requirements would be about as follows :—

Mutton to be of good second quality, 45 lb. to 50 lb. per carcase, not too fat. Beef : Hind and front quarters—good fair quality of steer beef, to weigh about 160 lb. to 175 lb. per quarter ; beef to be well-covered stuff, not too fat and wasteful. Loins of beef to be cut from hindquarters, weighing from 160 lb. to 200 lb., of better quality than the straight beef cut, without the rump, and cut at hip joint, with flank off and kidney and kidney-fat off. Ribs of beef cut from good-quality steer beef ; seven rib cuts, 12 in. to 14 in. long from chime-bone to end of rib-bone. These ribs and loins to be cut in good workmanlike manner, and the ribs properly skewered up to hold them in good shape. Veal : Good fat carcases, with pelts on and heads off ; carcases to weigh from 100 lb. to 125 lb., and shanks off at knee and hock joints. Also good fat veal with pelt off, and carcases split in sides, each side to weigh from 65 lb. to 100 lb. Calves' livers to be packed in about 25 lb. boxes and 50 lb. boxes. Boxes to be nicely lined with parchment paper, and livers packed in good shape. Ox-tongues to be trimmed and packed in boxes of, say, 25 tongues in a box. Sheep-kidneys to be packed in boxes of 5 dozen each, and

these boxes to be packed 5 boxes in a case. Rabbits, with pelt off, 2½ lb. to 3 lb. each, each rabbit to be wrapped in parchment paper, and packed 2 dozen in a crate; also rabbits with pelt on, to be packed 2 dozen in a case, and to weigh from 2½ lb. to 3 lb. each, or larger size would do. Beef kidneys packed 1 dozen in each box, and boxes packed in cases of 5 or 10 boxes each. Calves' sweetbreads and beef sweetbreads to be packed in tins of 5 lb. each—lard-pails would do—and about 6 tins packed in each case. The sweetbreads to be trimmed free of fat and tallow. The beef would be particularly wanted during the months of January, February, March, April, and May, but would not be required between the 1st of July and the 1st of January. I have no doubt that exporters of beef are aware that beef to be frozen requires to be fairly well covered with fat, otherwise it will look rather badly when thawed out.

Purchasers are prepared to establish a credit through their bankers, guaranteeing drafts on them for value of each shipment. The firms that import meat to Vancouver are—Vancouver-Prince Rupert Meat Company (Limited); Swift Canadian Company (Limited); P. Burns and Co. (Limited).

### Market Conditions.

*Butter.*—Since my last report the Ontario butter-market declined from 1 to 1¾ cents per lb., evidently on account of the heavy production and abundance of rain, which was beneficial to creameries. During the last few days this market has had an upward tendency, prices advancing about 1 c. per lb. This butter can be landed to-day delivered Vancouver at 29 c. per lb. The R.M.S. "Makura" landed 3,387 boxes of New Zealand butter. This is also a record for the month of August. There has been no butter offered from Alberta and Saskatchewan during the last month.

*Cheese.*—There is a good demand for Eastern Canadian cheese, and while cars in transit can now be landed in Vancouver at 16 c. per lb. delivered, prices during the last few days have shown a slight advance.

*Eggs.*—The demand for Ontario fresh eggs is still very good. Several cars have been received during the past few weeks of fresh-gathered stock, which have opened up very fine both as to quality and size. September prices are quoted—fresh eggs 28½ c.; and while the stock will be strictly fancy in every respect, the prices are very high. At this quotation they will cost 32¾ c. delivered Vancouver. Stock on hand to-day is quoted: Local fresh eggs 38 c., fresh Eastern 32 c., and selected 29 c.

*Apples.*—There is a very large quantity of Californian Gravensteins coming to this market, which are finding ready sale at $1·75 to $2·25. These are heavy pack and fine quality. A large number of apples have been received locally, such as Wealthy, Duchess, and a few Gravensteins. The quality of these apples, while green, is very satisfactory. Apples to-day are selling at from 75 c. to $1·50 per box, according to quality, variety, and grade.

*Potatoes.*—The potato-market is very unsettled at the present time, and any quantities of selected white potatoes are being purchased from $10 to $12 per ton delivered Vancouver. It is not certain how long this state of the market will last, but there is certainly very little profit in it for the grower at these prices. Okanagan and Ashcroft potatoes are being quoted at from $14 to $18 per ton f.o.b. shipping-point, costing $18 and $22 per ton delivered Vancouver.

*Beef and Mutton Prices.*—Beef, 12½ c. per lb.; mutton, local, 13½ c. per lb.; mutton, Australian, 13 c. per lb.; veal, local, 16 c. per lb.; veal, Australian, 14 c. per lb.; pork, 15 c. per lb.

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The importation of mutton, lamb, bacon, &c., into Brazil is spasmodic; but there is no reason why the trade cannot be developed. There is every probability of an increase in the consumption in the near future. Following are the names of some of the firms dealing in the importation of provisions (commission houses) established in Brazil: James Magnus and Co., 96 Rua de Sao Pedro; P. S. Nicolson and Co., 56 Rua Visconde de Inhauma; Norton Megaw and Co., 112 Rua Primeiro de Marco; McKinlay, Schmidt, and Co., 32 Rua Conselheiro Saraiva; C. N. Lefebvre, 76 Rua de Candelaria.—*New Zealand Government Agent at Buenos Aires.*

# SHIPMENTS OF PRIMARY PRODUCE FROM NEW ZEALAND TO UNITED KINGDOM.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

| Month. | | Mutton, Carcases. | Lamb, Carcases. | Beef, Quarters. | Butter, Boxes. | Cheese, Crates. | Wool, Bales. | Wheat, Sacks. | Oats, Sacks. | Rabbits, Crates. | Hemp, Bales. | Tow, Bales. | Kauri-gum, Cases. | Sundry. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, | 1912 | 237,284 | 302,399 | 12,424 | 114,512 | 64,005 | 95,994 | .. | .. | 7,295 | 6,365 | 1,942 | 3,407 | 59 carcases pork. |
| " | *1911* | *175,337* | *287,120* | *13,568* | *90,405* | *46,375* | *127,199* | .. | *16* | *399* | *15,234* | *3,302* | *7,094* | *590* " |
| February, | 1912 | 208,424 | 273,246 | 13,052 | 101,544 | 62,398 | 106,074 | 607 | .. | .. | 6,831 | 1,615 | 1,056 | .. |
| " | *1911* | *242,090* | *450,406* | *24,924* | *86,368* | *46,667* | *70,030* | *23,694* | *200* | .. | *4,428* | *1,302* | *2,113* | *1,369 carcases pork.* |
| March, | 1912 | 324,192 | 518,402 | 20,201 | 64,925 | 49,308 | 70,022 | .. | 4,980 | .. | 3,832 | 1,352 | 2,644 | 16 carcases pork. |
| " | *1911* | *264,297* | *665,822* | *26,657* | *45,912* | *40,668* | *58,362* | *40,276* | .. | .. | *3,650* | *1,583* | *8,982* | *2,408* " |
| April, | 1912 | 213,178 | 355,829 | 7,046 | 38,986 | 38,137 | 31,615 | 4,905 | 2,180 | .. | 5,134 | 1,958 | 4,458 | .. |
| " | *1911* | *172,503* | *491,413* | *19,106* | *14,823* | *33,411* | *42,917* | *38,456* | *6* | .. | *9,233* | *1,827* | *2,577* | *2,431 carcases pork.* |
| May, | 1912 | 454,506 | 744,287 | 32,691 | 1,441 | 40,535 | 51,833 | 11,157 | 26,569 | 1,500 | 11,963 | 2,826 | 6,287 | .. |
| " | *1911* | *204,390* | *377,105* | *20,173* | *995* | *20,732* | *33,033* | *93,854* | .. | .. | *7,443* | *1,210* | *7,720* | *1,087 carcases pork.* |
| June, | 1912 | 170,738 | 287,697 | 24,605 | 558 | 7,712 | 18,138 | 9,160 | 7,622 | 2,039 | 5,646 | 1,168 | 1,213 | 221 carcases pork. |
| " | *1911* | *214,079* | *448,432* | *15,789* | .. | *6,323* | *19,568* | *39,422* | .. | *14,128* | *4,763* | *525* | *5,528* | *2,434* " |
| July, | 1912 | 291,097 | 371,474 | 29,457 | 684 | 1,255 | 16,567 | 44,324 | 23,216 | 20,573 | 7,463 | 1,856 | 5,892 | 210 carcases pork. |
| " | *1911* | *206,869* | *260,761* | *14,296* | .. | *276* | *14,100* | *29,452* | .. | *10,334* | *6,022* | *1,073* | *2,786* | *175* " |
| August, | 1912 | 207,239 | 157,589 | 10,478 | 559 | .. | 10,409 | 42,580 | 38,802 | 19,562 | 3,758 | 523 | 4,219 | .. |
| " | *1911* | *66,608* | *110,054* | *3,653* | .. | .. | *5,260* | *31,976* | .. | *18,231* | *3,443* | *303* | *3,475* | *203 carcases pork.* |
| September, | 1912 | 44,657 | 40,759 | 1,174 | 8,723 | 1,204 | 6,671 | 15,742 | 17,363 | 19,933 | 2,957 | 501 | 3,671 | .. |
| " | *1911* | *102,081* | *40,057* | *6,059* | *6,404* | .. | *7,390* | *38,151* | .. | *33,059* | *5,604* | *393* | *7,672* | *220 carcases pork.* |
| October, | 1911 | 9,417 | 2,043 | 100 | 49,626 | 11,501 | 2,182 | .. | .. | 32,094 | 4,514 | 754 | 2,982 | .. |
| " | *1910* | *49,010* | *800* | *10,531* | *60,014* | *9,159* | *3,189* | *94,815* | *23,330* | *36,947* | *3,632* | *1,232* | *3,089* | *56 carcases pork.* |
| November, | 1911 | 47,770 | 10,427 | 403 | 135,741 | 57,319 | 44,934 | 15,833 | .. | 16,606 | 7,844 | 2,183 | 3,085 | .. |
| " | *1910* | *62,926* | *29,877* | *5,554* | *105,759* | *27,749* | *55,551* | *76,594* | *331* | *28,646* | *6,850* | *2,300* | *4,339* | *911 carcases pork.* |
| December, | 1911 | 72,192 | 91,965 | 765 | 109,397 | 46,883 | 54,297 | .. | .. | 4,366 | 5,719 | 1,364 | 2,708 | .. |
| " | *1910* | *82,405* | *157,172* | *13,155* | *182,051* | *67,162* | *59,080* | .. | .. | *9,716* | *4,524* | *109* | *5,363* | *686 carcases pork.* |

# HEMP AND TOW GRADING RETURNS.

## SEPTEMBER, 1912.

*Hemp.*—The total number of bales graded was 6,863, as compared with 6,510 bales for the corresponding month of last year, an increase of 353 bales. For the twelve months ending 30th September, 1912, the number of bales graded was 91,519, as compared with 97,427 for the previous twelve months, the decrease being 5,908 bales.

*Tow.*—During the month 1,911 bales were dealt with, as compared with 1,549 for the corresponding month of last year, an increase of 362 bales. For the twelve months ending 30th September, 1912, the number of bales graded was 25,750, as against 29,442 for the previous twelve months, the decrease being 3,692 bales.

HEMP AND TOW GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF SEPTEMBER, 1912.

*Hemp.*

| Port. | Superior. | Fine. | Good-fair. | Fair. | Common. | Rejected. | Condemned. | Total. |
|---|---|---|---|---|---|---|---|---|
| | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. | Bales. |
| Auckland .. | .. | .. | 52 | 286 | 99 | 8 | 11 | 456 |
| Napier .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Foxton .. | .. | 5 | 865 | 2,439 | 80 | 6 | .. | 3,395 |
| Wellington .. | .. | 36 | 1,602 | 670 | 26 | 3 | .. | 2,337 |
| Blenheim .. | .. | 19 | .. | .. | .. | .. | .. | 19 |
| Picton .. | .. | 58 | 192 | 54 | .. | .. | .. | 304 |
| Lyttelton .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dunedin .. | .. | .. | 116 | 9 | .. | .. | .. | 125 |
| Bluff .. | .. | .. | 63 | 159 | 5 | .. | .. | 227 |
| Totals .. | .. | 118 | 2,890 | 3,617 | 210 | 17 | 11 | 6,863 |
| Percentages of totals | .. | 1·72 | 42·11 | 52·70 | 3·06 | 0·25 | 0·16 | 100 |

*Tow.*

| Port. | First Grade. | Second Grade. | Third Grade. | Condemned. | Total. |
|---|---|---|---|---|---|
| | Bales. | Bales. | Bales. | Bales. | Bales. |
| Auckland .. | .. | 62 | 92 | 63 | 217 |
| Napier .. .. | .. | .. | .. | .. | .. |
| Foxton .. .. | 143 | 493 | 44 | .. | 680 |
| Wellington .. | 388 | 425 | 25 | 14 | 852 |
| Blenheim .. | .. | 10 | .. | .. | 10 |
| Picton .. .. | 26 | .. | .. | .. | 26 |
| Lyttelton .. | .. | 75 | .. | .. | 75 |
| Dunedin .. | .. | 11 | .. | .. | 11 |
| Bluff .. .. | .. | 26 | 14 | .. | 40 |
| Totals .. | 557 | 1,102 | 175 | 77 | 1,911 |

*Stripper-slips.*—Wellington, passed for shipment 159, condemned 5: total 164. Foxton, passed for shipment 139: total 139.

## NEW ZEALAND-VANCOUVER SUBSIDIZED STEAM SERVICES.

Following are the shipments of produce for Vancouver and North American ports from New Zealand since March last:—

| | "Makura," 14th May. | "Zealandia," 10th June. | "Marama," 5th July. | "Makura," 2nd Aug. | "Zealandia," 30th Aug. | "Marama," 27th Sept. |
|---|---|---|---|---|---|---|
| Butter, boxes | 1,510 | 80 | 1,600 | 3,987 | 2,717 | 4,428 |
| Eggs, " | .. | .. | .. | .. | .. | 8 |
| Veal, carcases | 52 | .. | .. | .. | .. | |
| Beef, quarters | 8 | 40 | .. | .. | .. | .. |
| Beef, boned, bags | 25 | 605 | .. | .. | .. | .. |
| Frozen sundries, packages | 7 | 8 | 4 | 6 | 8 | .. |
| Wool, bales | 178 | 27 | 9 | 21 | .. | .. |
| Grass-seeds, beans, &c., sacks | .. | 260 | 21 | 430 | .. | .. |
| Hides and skins, sacks, &c. | 419 | 344 | 861 | 425 | 454 | 657 |
| Onions, cases | 350 | 2 | .. | .. | 3 | .. |
| Sheep-skins, bales | 45 | 35 | .. | 20 | .. | .. |
| Jam, cases | 150 | .. | .. | .. | 50 | .. |
| Sundries, packages | 46 | 111 | 110 | 144 | 90 | 5 |
| Potatoes, crates | .. | 17 | .. | .. | 21 | .. |
| Kauri-gum, packages | .. | .. | .. | .. | 72 | 69 |

## NEW ZEALAND-SAN FRANCISCO SUBSIDIZED STEAM SERVICES.

The following are the shipments of produce for San Francisco, Rarotonga, and Tahiti from New Zealand since March last:—

| | "Tahiti," 24th May. | "Manuka," 21st June. | "Aorangi," 19th July. | "Tahiti," 16th Aug. | "Moana," 12th Sept. |
|---|---|---|---|---|---|
| Gum, packages | 7 | 24 | 4 | .. | 14 |
| Seeds, sacks | 88 | 340 | .. | .. | .. |
| Grain, &c. | 73 | 46 | 60 | 82 | 123 |
| Meats, cases | 140 | 153 | 161 | 190 | 326 |
| Onions, cases and sacks | 1 | 2 | 5 | 2 | 3 |
| Potatoes, " | 48 | 37 | 30 | 25 | 3 |
| Timber, bundles | 500 | .. | .. | .. | .. |
| Sundries, packages | 73 | 92 | 380 | 121 | 263 |
| Butter, boxes | 2 | 2 | 3 | 5 | 1,147 |
| Apples, cases | 6 | .. | 4 | .. | .. |
| Hemp, bales | .. | .. | .. | 129 | 386 |

# STOCK EXPORTED.

## SEPTEMBER, 1912.

The following table shows the numbers and descriptions of stock exported from the Dominion :—

| Port of Shipment. | Horses. | | | Cattle. | | Sheep. | | | | Swine. |
|---|---|---|---|---|---|---|---|---|---|---|
| | To Australia. | To Pacific Islands. | To Fiji. | To Pacific Islands. | To Australia. | To Australia. | To Argentine. | To South America. | To Pacific Islands. | To Pacific Islands. |
| Auckland .. .. | 50 | 15 | 22 | 9 | .. | .. | .. | .. | 381 | 39 |
| Gisborne .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Napier .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Wellington .. .. | 73 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Lyttelton .. .. | 15 | .. | .. | .. | .. | 14 | 4 | .. | .. | .. |
| Timaru .. .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Dunedin .. .. | .. | .. | .. | .. | .. | .. | .. | 80 | .. | .. |
| Bluff .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Totals .. .. | 140 | 15 | 22 | 9 | .. | 14 | 4 | 80 | 381 | 39 |

Following are particulars of the horses shipped : 87 draughts (4 stallions, 26 mares, 35 geldings, 22 fillies), 44 mixed draughts (18 mares, 26 geldings), 6 thoroughbreds (2 mares, 3 geldings, 1 colt), 36 hackneys (33 mares, 2 geldings, 1 foal), 4 ponies (1 mare, 3 geldings).

# PRODUCE IMPORTED.

The following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of September, 1912, of agricultural and farm products :—

| Item. | Quantity. | Value. |
|---|---|---|
| | | £ |
| Bran .. .. .. .. .. | tons | .. |
| Butter .. .. .. .. | cwt. | .. |
| Cheese .. .. .. .. | 1 cwt. | 3 |
| Chaff .. .. .. .. .. | 1 ton | 7 |
| Fruits, fresh, all kinds .. .. .. | 1,698,474 lb. | 17,662 |
| Barley .. .. .. .. | 218 centals | 74 |
| Oats .. .. .. .. .. | 3 centals | 4 |
| Wheat .. .. .. .. | centals | .. |
| Onions .. .. .. .. | 8,355 cwt. | 5,184 |
| Pollard and sharps .. .. .. | tons | .. |
| Potatoes .. .. .. .. | tons | .. |
| Seeds, grass and clover .. .. .. | 697 cwt. | 2,593 |
| Total values imported .. | .. | £25,527 |

# STOCK IN QUARANTINE.

The following stock was received into quarantine during the month of September:—

| No. | Breed. | Sex. | Port of Origin. | Owner or Agent. | Address. |
|---|---|---|---|---|---|
| | | Motuihi Island (Auckland). | | | |
| 1 | Great Dane boar-hound | Female .. | Liverpool .. | Mr. P. H. McDonald | Otahuhu. |
| 1 | Devon .. | Heifer .. | Sydney .. | New Zealand Loan and Mercantile Co. | Auckland. |
| 1 | Jersey .. | Bull .. | " .. | W. J. Hall .. | Matatoki. |
| 1 | Holstein .. | " .. | Vancouver .. | H. S. Logan .. | New Westminster. |
| 10 | " .. | Heifers .. | " .. | | |
| 1 | Shorthorn .. | Bull .. | Sydney .. | Dalgety and Co. .. | Auckland. |
| 1 | Devon .. | " .. | " .. | | |
| | | Somes Island (Wellington). | | | |
| 1 | Red .. | Bull .. | Sydney .. | J. C. Wright .. | Matapu. |
| 4 | Thoroughbred | Stallions .. | San Francisco | R. McMillan .. | Halswell. |
| 2 | " | Fillies .. | Ditto .. | | |
| 1 | Brindle bull-dog | Male .. | London .. | P. Tite .. .. | Wellington. |
| | | Quail Island (Lyttelton). | | | |
| 1 | Wire-haired fox-terrier | Female .. | Liverpool .. | F. Rogen .. | St. Clair, Dunedin. |
| 2 | Ditto pups .. | " .. | " . | | |
| 3 | " .. | Male | " . | | |

# THE CANADIAN MARKET.

The following figures, taken from the weekly reports of the Department of Trade and Commerce at Ottawa, are furnished by Mr. Vincent A. Ward, honorary New Zealand Agent at Montreal:—

Imports into Canada.

| From— | 1909. £ | 1910. £ | 1911. £ | 1912. £ |
|---|---|---|---|---|
| New Zealand .. | 71,675 | 161,735 | 171,353 | 314,684 |
| Australia .. | 85,825 | 107,406 | 94,965 | 74,430 |

Exports from Canada.

| To— | | | | |
|---|---|---|---|---|
| New Zealand .. | 191,019 | 172,960 | 200,563 | 319,034 |
| Australia .. | 606,813 | 707,319 | 762,767 | 823,326 |

# THE BRITISH PRODUCE MARKET.

## HIGH COMMISSIONER'S CABLED REPORTS.

THE Department has received the following cablegrams from the High Commissioner for New Zealand. (NOTE.—Quotations, unless otherwise specified, are average market prices on spot.)

London, 14th September, 1912.

*Mutton.*—The market is firm, with a hardening tendency, and shows signs of strength. High prices are restraining business for retail, but there is a general and active demand for future delivery. Canterbury 4⅝d. per lb., North Island 4½d.

*Lamb.*—The market is firm. A good demand for heavy weights. Canterbury 5¾d. per lb, other than Canterbury 5⅝d.

*Beef.*—The market is firm. Buyers are making forward purchases at present prices. New Zealand hinds 4d. per lb., fores 3½d.

*Butter.*—The butter-market is firm for best quality, but quiet for ordinary quality, fairly large quantities of which are at present in store. The shipment of butter ex s.s. "Rotorua" arrived in good condition. Choicest New Zealand 120s. per cwt., Danish 128s., Australian 112s., Siberian 108s.

*Cheese.*—The market is steady. The average price for the week for finest New Zealand cheese is 67s. per cwt., Canadian 66s., English Cheddar 73s.

*Hemp.*—The market is firm at the advance. Reports from Manila indicate high price in distant deliveries. Spot: New Zealand good-fair grade £27 10s. per ton, fair grade £26. Forward shipment at same price. Fair current Manila, spot, £27 10s. per ton, forward shipment £28 per ton. The output from Manila for the week was 23,000 bales.

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London, 21st September, 1912.

*Mutton.*—The market is slightly weaker, with less demand, on account of the high prices, but stock is moderate. Holders are firm, no change in prices—viz., Canterbury 4⅝d. per lb., North Island 4½d.

*Lamb.*—The market is quiet. The weather lately has been very unfavourable to the sale of lamb. Supplies of home-grown lambs are heavy and are lowering the prices of New Zealand lamb. Canterbury 5⅝d. per lb., other than Canterbury 5½d.

*Beef.*—The market is firm, although large supplies are coming forward. Plate chilled curtails the retail demand. New Zealand hinds 3⅞d. per lb., fores 3½d. Plate chilled hinds 4⅝d., fores 3¼d.

*Butter.*—The market is very firm, with a brisk demand for best quality, but for ordinary quality, of which a large quantity is on hand, a poor demand continues. Prospects are uncertain, and speculative. New Zealand in second hands, nominal, 122s. per cwt., Australian 114s., Danish 131s., Siberian 110s.

*Cheese.*—The market is quiet, little doing. A good feeling prevails. Canadian 65s. 6d. per cwt., English Cheddar 73s., New Zealand at second hand 67s.

*Hemp.*—The market is firm. There is a better demand. A good business has been done in distant deliveries, October–December. New Zealand good-fair grade £27 10s. per ton, fair £26; fair current Manila £28, January to March £28 10s. The output from Manila for the week was 18,000 bales. Stock New Zealand hemp, 1,025 tons.

*Wool.*—Market remains firm, and prices have slightly advanced for all grades of merinoes.

*Cocksfoot-seed.*—The market is quiet. Continental good quality is selling at low price.

*Linseed.*—The market is firm, with a hardening tendency. Bombay 63s. 6d., Calcutta 62s. 9d., Plate 56s., New Zealand nominal 66s. 6d.

*Wheat.*—The market is quiet but steady. English is in an unsatisfactory condition. New Zealand long-berried, ex granary, 40s. per quarter of 496 lb.

*Oats.*—The market is firm, with more inquiry. New Zealand short sparrowbills, ex granary, 26s. 6d. per quarter of 384 lb.

*Peas.*—The spot market is steady, but the demand is principally speculative. New Zealand partridge, 40s. 6d. per 504 lb.

*Beans.*—The market is steady, with an improved demand on account of the English crop being in a bad condition. New Zealand beans, f.a.q., new crop, 38s. 6d. per 504 lb.

———

London, 28th September, 1912.

*Mutton.*—The market is steady. Supplies will be moderate, and holders are firm. Canterbury 4⅝d. per lb., North Island 4¼d.

*Lamb.*—The market is slightly weaker, with less demand. Canterbury 5⅝d. per lb., other than Canterbury 5½d.

*Beef.*—The market is quiet, but firm. Frozen meat arrivals are heavier than usual. New Zealand hinds 3¾d. per lb., fores 3⅛d.

*Butter.*—The market remains firm at last quotations. New Zealand 122s. per cwt., Australian 114s., Danish 131s., Siberian 110s.

*Cheese.*—The market is quiet, with no alteration in prices. Canadian 65s. 6d. per cwt., New Zealand 67s.

*Hemp.*—The market is very firm. There is a general and active demand. New Zealand good-fair grade £28 5s., fair grade £27, fair current Manila £28 15s. per ton, for all positions. The output from Manila for the week was 27,000 bales.

*Wool.*—The market is strong.

*Kauri-gum.*—The market is firm. A good demand continues. Prices have slightly advanced for all grades. Dark-brown selected rescraped £7 to £8 per cwt., three-quarter scraped, 85s. to 100s.; chips, drossy, 30s. to 45s.; rescraped pale amber, £12 to £14; three-quarter pale scraped, 150s. to 170s.; diggers' chips, good, 50s. to 60s. 228 cases offered; about 120 cases sold. Stock, 31st August, 1912, 375 tons.

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London, 5th October, 1912.

*Mutton.*—The market is firm, with a hardening tendency in anticipation of small arrivals. No immediate change in the market is expected. Canterbury 4⅝d. per lb., North Island 4¼d.

*Lamb.*—The market is steady. There is not much demand, but prices are firm. Canterbury 5⅝d. per lb., other than Canterbury 5½d.

*Beef.*—The market is slightly weaker, with less demand. A large supply. New Zealand hinds 3¾d. per lb., fores 3d.

*Butter.*—The market is very firm for best quality, but quiet for second-class quality. Danish 121s. per cwt., Siberian 110s., Australian 114s.

*Cheese.*—The market is quiet but steady. Canadian 65s. per cwt. Estimated Canadian stock in England, 1st October, 317,000 boxes. English Cheddar 73s. per cwt.

*Hemp.*—The market is firm, and prices continue to advance. It is reported that American buyers are operating for a rise in Manila. Buyers are fearing an advance, and are buying freely. Spot: New Zealand good-fair grade £29 per ton, fair grade £27 10s., fair current Manila £29. January–March: New Zealand good-fair £29 10s., fair grade £28, fair current Manila £30. The output from Manila for the week was 26,000 bales.

*Wool.*—The market is firm at the advance. Current quotations for Bradford tops: 36's, low crossbreds, 1s. 2½d. per lb.; 40's, low crossbreds, 1s. 2¾d.; 44's, medium crossbreds, 1s. 3½d.; 50's, halfbreds, 1s. 6¾d.; 56's, quarterbreds, 1s. 9¼d.; 60's, merinoes, 2s. 2½d.

*Mutton and Lamb.*—River Plate shipments received during September, 1912:—

| | Mutton. Carcases. | Lamb. Carcases. |
|---|---|---|
| London .. .. .. .. | 49,084 | 18,235 |
| Liverpool .. .. .. .. | 42,466 | 5,034 |
| Cardiff .. .. .. .. | 7,746 | 58 |
| Hull .. .. .. .. .. | 8,000 | 651 |
| Southampton .. .. .. .. | 6,421 | 880 |
| Plymouth .. .. .. .. | 500 | 500 |
| Newcastle .. .. .. .. | 8,000 | Nil |
| | 122,217 | 25,358 |
| September, 1911 .. .. .. | 261,878 | 100,241 |